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THE

VETERINARY BULLETIN

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DISEASES CAUSED BY BACTERIA AND FUNGI

BARBER, M. (1947.) **Staphylococcal infection due to penicillin-resistant strains.**—*Brit. med. J.* November 29th. 863–865. **2843**

The increase of penicillin resistant strains of staphylococci is noted, this being most significant in hospitals where large amounts of penicillin are used. By comparing the results obtained from treatment of two series of cases in the same hospital in 1946 and 1947 the proportion of resistant strains was observed to have increased markedly from one year to the other. The strains isolated were all grossly resistant and all except one which was not tested, produced penicillinase, whilst all were sensitive to streptomycin with the exception of one isolated from a patient who was being treated with this antibiotic. The types of infection from which the staphylococci were recovered were various.

The resistant strains have not acquired resistance as a result of treatment with penicillin. The source of these strains is discussed; whilst some occur naturally in the original lesion, many others gain access to the disease process in hospital. For detection of these strains, a penicillin ditch-plate with a concentration of 10 units of penicillin per ml. of agar is recommended. A heavy inoculum on the ditch-plate is essential as penicillinase-producing staphylococci may appear sensitive if the number of bacteria is small. Further, resistant strains can be detected by this method among sensitive strains in the ratio of 1 : 1,000.—C. D. WILSON.

BAUMGARTNER, H. (1947.) Die Penicillinbehandlung des Euters. **[Penicillin treatment of the udder.]**—*Schweiz. Arch. Tierheilk.* **89.** 216–240. **2844**

"Mastitis producing streptococci" were completely inhibited on media containing 0·01–0·05 I.U. per ml. Apparently resistant strains isolated from infected quarters after four penicillin treatments still showed the same high sensitivity towards penicillin *in vitro*. Staphylococci were found to be inhibited by 0·02 I.U. per ml., but 4–15 % of the strains may be regarded as penicillin resistant. Atypical staphylococci were found to be even more sensitive than streptococci.

Pure and mixed cultures used as starter organisms in cheese making were inhibited by 0·01–0·03 I.U. per ml. during an eight-hour incubation. Ten times as much penicillin was needed to inhibit lactic acid production during a period of 24 hours. Milk from penicillin-treated quarters contains, for 1–3 days after treatment, enough penicillin to kill off starter organisms even after the normal dilution (1 : 100) during cheese making and should not be used until four days after treatment. Irritation of the udder is caused by the injection of excessively large volumes of liquid and not by the antibiotic which may conveniently be given in sterile distilled water, except in severely inflamed conditions where physiological saline or oil emulsions may be indicated.

Of 82 quarters infected with *Streptococcus agalactiae* 64 were completely cured by treatment with penicillin. In seven quarters the clinical manifestations were cleared up, but some slight alterations in the milk picture remained. In one case re-infection with staphylococci occurred and there was a recurrence of streptococcal mastitis in six cases. Four quarters, of which three had a single treatment only, were not improved by the treatment.

Although 54 quarters had responded to a single infusion of penicillin, the remainder were not cured until after 2–3 treatments.

The author recommends three intramammary infusions of about 10,000 I.U. in 5–50 ml. per quarter at intervals of 12–36 hours.

Penicillin was shown to be vastly superior to other methods of treatment.—R. FRIEDMANN.

FOLEY, E. J., STULTS, A. W., LEE, S. W., & BYRNE, J. V. (1949.) **Studies on vehicles for sustaining penicillin levels in the bovine mammary gland.**—*Amer. J. vet. Res.* **10.** 66–70. **2845**

The authors attempted to produce a vehicle

which would give greater persistence of penicillin at a concentration of 0·5 units per ml. in the udder following a single injection than that given by water alone.

Two such vehicles, A and B, were prepared. A contained an emulsion of mineral oil, water and lanoline derivatives and B contained, in addition, a small quantity of propylene glycol and a non-ionic wetting agent. After injecting 100,000 units of sodium penicillin in 20 ml. of either water or vehicles A or B into udders in varying stages of lactation penicillin was found to persist longer in the milk with vehicle A than with water and still longer with vehicle B.

This persistence might result from the lighter-than-water emulsions rising to the higher parts of the udder and permeating the duct system owing to the fineness of the emulsion.

The authors recommend a single injection of 100,000 units of penicillin in vehicle B as the persistence of therapeutic levels for up to 72 hours should allow even the slowly multiplying organisms to be exposed to penicillin when in their most susceptible condition.—E. J. H. Ford.

Stults, A. W., & Foley, E. J. (1948.) **Treatment of *Streptococcus agalactiae* mastitis by single injections of penicillin in retaining vehicles.**—*J. Amer. vet. med. Ass.* **113.** 68–74. **2846**

The vehicles A and B used in this clinical trial are described and their use in procuring a persistent penicillin level in the udder is studied [see preceding abst.].

From a commercial herd of 500–600 animals quarter samples were examined by the Hotis test before treatment and at the 10th day, 20th day and at monthly intervals afterwards.

Treatment consisted of a single injection of 100,000 units of sodium penicillin in vehicle A or B followed by milking at 12-hourly intervals. A quarter was considered cured if free from *Str. agalactiae* three weeks or longer after treatment. Owing to non-segregation of infected cows there was a re-infection rate of about 10%.

When vehicle A was used 87% of 240 quarters were cured following a single treatment.

With vehicle B 91·8% of 98 quarters were cured and with B fortified with 40 mg. tyrothricin 77·1% of 62 quarters were cured. An acute inflammation of the quarter followed this last method of treatment. A total of 440 treatments, including re-treatments, was necessary to cure 383 quarters, an average of 1·14 treatments per quarter.

The authors point out that using aqueous penicillin repeated instillations had previously been necessary and hence the use of water-in-oil vehicles, especially of a type similar to B, should be of value under farm conditions, the importance of accurate diagnosis, good hygiene and segregation of course being recognized.—E. J. H. Ford.

Langer, P. H., Burkhart, R. L., Schroeder, C. R., & Welsh, M. (1948.) **Sulfamethazine blood and milk concentrations in dairy cows.**—*J. Dairy Sci.* **31.** 103–109. **2847**

Various sulphonamides have been used in treatment of mastitis and, as their effectiveness is assumed to be a function of their blood levels, the authors studied the relation between blood and milk concentration of sulphamethazine. Using drug doses of 1·5 gr. per lb. subcutaneously, orally and by intramammary infusion for one day and 1 gr. per lb. on the second day, milking at 0 and 12 hours, the free sulphamethazine in the milk and blood was estimated at four-hourly intervals over two days. The results indicated that sulphamethazine diffuses slowly from blood to milk and from milk to blood. Concentrations of 5 mg. % or more in milk depends upon a persistent level of over 10 mg. % in blood. All three routes gave blood and milk levels considered to be bacteriostatic and levels of over 5 mg. % in milk could be obtained after peroral or parenteral sulphamethazine administration once daily.—Malcolm Woodbine.

Hoerlein, B. F., & Schalm, O. W. (1948.) **Penicillin infusions and penicillin bougies in the treatment of chronic mastitis.**—*J. Amer. vet. med. Ass.* **113.** 43–47. **2848**

In order to compare the effects of 50,000 units of penicillin in aqueous solution with the same dose administered as a wax bougie, a commercial herd of 225 Holstein-Friesians containing 21 animals with *Streptococcus agalactiae* mastitis was used. The affected animals were isolated and bacteriological examination of quarter samples revealed 46 infected quarters, in 43 of which there were clinical changes and 32 gave altered milk.

On four consecutive days after morning milking 23 of the quarters were infused with 50,000 units Ca penicillin in distilled water and the remaining quarters were treated with 50,000 units K penicillin in a wax bougie. Bacteriological examination of milk samples was carried out at weekly intervals for six weeks and penicillin concentration in the milk was assayed at 12 and 24 hours after each treatment.

Results given in a table indicated that with each method of administration 19 of the quarters were rendered free and remained free from *Str. agalactiae* for six weeks. The remaining four quarters in each group were re-treated and rendered free except for one quarter in the bougie treated group.

There were wide variations in penicillin assays in individual quarters with an average at 12 hours

in the infused quarters of 27·4 units per ml. and in the bougie-treated quarters of 41·3 units per ml. At 24 hours the figures were 1·67 units per ml. and 1·90 units per ml. respectively.

It is pointed out that there was difficulty in inserting bougies into three of the quarters and that bougies with a diameter of less than 3 mm. might be more useful.—E. J. H. FORD.

LANCASTER, J. E., & STUART, P. (1949.) **Experiments on the transmission of *Streptococcus agalactiae* infection by milking with infected hands.**—*J. comp. Path.* **59.** 19–30. **2849**

A comparison is made of the susceptibility to the infection with *Str. agalactiae* of seven first-calved heifers, five second calvers and six older cows, five of which had been cured of *Str. agalactiae* type Ib infection in the previous lactation.

Milk from a donor cow infected with *Str. agalactiae* type IIIa was smeared on the teats of all cows at each milking which was by hand. After 15 weeks the percentages of quarters infected in each group were: first-calved heifers 11%; second calvers 35% and older cows 81%. Clots appeared in the milk of 74% of the quarters. The older cows readily became infected while the first-calf heifers were relatively resistant. *Str. agalactiae* was equally persistent on the skin of the teats of susceptible and resistant cows. The interval between calving and infection was not constant. —J. I. TAYLOR.

STUART, P., & LANCASTER, J. E. (1949.) **Some factors which may be considered in the susceptibility of the bovine udder to *Str. agalactiae* infection.**—*J. comp. Path.* **59.** 31–41. **2850**

Following a previous paper [see preceding abst.] the authors did not consider that the presence of teat injuries, except those on the orifice, made the animal more liable to infection. Cows with patent teats were likely to become infected, although they suggest that the main defence barrier is in the udder.

No connexion was found between the size of the dose and the establishment of persistent infection, nor did the inoculation of the secretion or filtrates from non-bacterial mastitis produce infection.—J. I. TAYLOR.

CHU, S. J. (1949.) **Bovine mastitis: a comparison of the value of diagnostic methods.**—*J. comp. Path.* **59.** 81–90. **2851**

The chloride, catalase, Whiteside and total cell count tests are useful for detecting inflammation of the udder and are more in agreement with the histopathological findings than with cultural tests of milk or udder tissue. Pathological changes in the udder caused by *Str. agalactiae* are described.—J. I. TAYLOR.

SELLERS, K. C. (1949.) **The production of hyaluronidase by *Streptococcus agalactiae* (Lancefield's group B).**—*J. comp. Path.* **59.** 109–112. **2852**

Hyaluronidase was produced in small amounts by 52 strains of *Str. agalactiae* isolated from clinical and sub-clinical mastitis and from cows' skin, but there was no relation between the source of the strain and its activity. The mucin clot prevention test was used for 45 strains and was more satisfactory than the rabbit skin diffusion test. No increase in the hyaluronidase activity followed serial passage of the strain through mice.—J. I. T.

PUGET, E., BAUDÉAN, E., & DELCASSÉ, H. (1948.) Erysipèle et stomatite érysipélateuse chez le cheval. Sulfamidothérapie-pénicillinothérapie. **[Equine streptococcal erysipelas. Sulphonamide and penicillin therapy.]**—*Rev. Méd. vét., Lyon et Toulouse.* **99.** 531–541. **2853**

Four cases of streptococcal erysipelas of the lips with concomitant involvement of the tongue and buccal mucosa are described. Prognosis was grave with death in 8–10 days. Sulphonamide treatment was effective but in one case in which it failed, local and general penicillin treatment used concurrently resulted in recovery.—G. V. L.

SOLTYS, M. A. (1948.) **Anthrax in a laboratory worker, with observations on the possible source of infection.**—*J. Path. Bact.* **60.** 253–257. [Author's summary copied *verbatim*.] **2854**

Spores of *B. anthracis* in films on slides may withstand the temperature of the Bunsen flame for 5–6 seconds.

None of the common stains and methods of staining used in bacteriological technique destroyed all spores in films on glass slides.

Mercuric chloride solution (1 : 1000) killed the spores of *B. anthracis* smeared on slides after these had been immersed for 5 minutes. Spores were also destroyed by a saturated solution of potassium permanganate after 5 minutes' exposure, and by a 4 per cent. solution after 15 minutes' exposure. Potassium permanganate, however, rendered the slide unsuitable for further staining.

Guinea-pigs infected with cultures of *B. anthracis*, which may have contained spores, invariably showed the presence of spores in the recently opened carcass.

Evidence was obtained that viable spores may escape into the atmosphere if spore suspensions of *B. anthracis* in saline are heated in open containers.

HOLTH, H. (1944.) **Investigations respecting the utility of the complement fixation test as a diagnostic of tuberculosis in man and animals.** —*Skand. VetTidskr.* **34.** 577–602; & 641–672. [In English: Swedish summary.] **2855**

A description is given of numerous experiments using a complement fixation test for TB. in cattle, pigs, poultry, horses and man. The antigen employed was an acid extract of living or dead tubercle bacilli, human and bovine. Quantitative results are expressed by varying the amount of test serum used.

Samples of serum from 524 cattle were investigated, of which 120 were known to have been tuberculous and in 151 of which there was no evidence of the disease at P.M. examination. The remaining samples came from cattle investigated, with negative results, for contagious abortion. It was found from the results that fixation of complement could be expected of the unheated serum from the majority of the tuberculous cattle, but that a temperature of 53°C. applied for 15 min. materially reduced or destroyed the complement fixing power of the serum. Of the 151 non-tuberculous cattle, weak complement fixation was demonstrated in 37. The author concludes that, using unheated serum, the complement fixation test may assist in the diagnosis of TB. in cattle, but that a quantitative diagnostic criterion must be applied to the results, to eliminate the weak non-specific positive reactions. Because cattle with contagious abortion often give non-specific tuberculin reactions, 47 cases were examined by the complement fixation test; a weakly positive response was obtained in two.

Experiments were also carried out on samples from 300 pigs, of which 34 were tuberculous, and both goats' cells and ox cells were tried for the indicator system. It was found that complement fixing antibody was present in small quantities in only some of the affected animals, and the test proved unreliable. Irregular results were likewise obtained in tests on tuberculous poultry.

In a series of detailed experiments on 140 horses, the tuberculin reaction as well as the complement fixation test was studied, because of the non-specific tuberculin reactions known to occur frequently in normal horses. The material included healthy horses and horses immunized with antigens other than tuberculin. It was found that healthy horses might give non-specific positive reactions both to the tuberculin test and to the complement fixation test, but that each animal did not necessarily respond in the same way to both tests. The resistance of the complement fixing antibody to heat was inconstant.

The complement fixation test was applied to 362 samples of serum from tuberculous human patients, of which 275 were positive, 16 doubtful and 71 negative. It was likewise applied to 44 samples from Pirquet negative patients, of which nine were positive and 35 negative. The sera were inactivated and a goats' cell indicator system was used. H. concluded that a 20% failure in both groups indicated that the test was inadequate as a diagnostic procedure. The use of a human cell indicator system gave very unsatisfactory results.—G. FULTON ROBERTS.

THOMANN, H. (1949.) Untersuchungen über das Vorkommen der "Skin-Lesion" beim schweizerischen Braunvieh. **[The presence of skin-lesion in Swiss cattle.]**—*Schweiz. Arch. Tierheilk.* **91.** 237–264. **2856**

An account of 65 cases of so-called skin lesion tuberculosis. Those affected were mainly animals of 2–4 years of age, which had spent some time on alpine pastures. All gave a positive reaction to the intradermal tuberculin test. Six of these were then tested by the subcutaneous test but no reaction was observed. Fifteen of the cases were slaughtered; no lesions of tuberculosis were found P.M. In the skin lesions themselves, acid-fast pleomorphic rods were demonstrated, which were not identical with the tubercle bacillus. Culture was unsuccessful; the inoculation of g. pigs and of two bulls yielded negative results. —L. M. MARKSON.

HEPPLESTON, A. G. (1949.) **Quantitative air-borne tuberculosis in the rabbit. The course of human type infection.**—*J. exp. Med.* **89.** 597–610. [Author's summary copied *verbatim.*] **2857**

Pulmonary tuberculosis in unselected rabbits, induced by primary quantitative air-borne infection with human type tubercle bacilli, may retrogress or progress. Some animals whose disease was in a stationary condition might have fallen into one of the above groups had the experiments been prolonged.

Within the limits of the observations natural resistance or susceptibility appears to be the chief factor in determining the course of the disease.

Following the development of the primary lesions the tuberculin reaction became positive but thereafter proved to be an unreliable indicator of the course of the disease.

Tubercle bacilli can be recovered from macroscopically normal lung tissue of rabbits several weeks after primary infection.

Reinfection did not induce the formation of new lesions nor alter the course of the disease caused by the primary infection.

LURIE, M. B., & ABRAMSON, S. (1949.) **The efficiency of gauze masks in the protection of rabbits against the inhalation of droplet nuclei of tubercle bacilli.**—*Amer. Rev. Tuberc.* **59.** 1–9. [Spanish summary. English summary copied *verbatim.*] **2858**

Under the conditions of these experiments, from 90 to 95 per cent of pathogenic droplet

nuclei of virulent bovine tubercle in the respired air can be removed by gauze masks properly worn by rabbits during quiet breathing of heavily infected air. A method is described by which much pertinent information in regard to this problem can be acquired. The application of these data to the wearing of masks by human beings exposed to air-borne tuberculous contagion is discussed.

STEENKEN, W., Jr., & WOLINSKY, E. (1949.) **The tuberculostatic effect of subtilin *in vitro* and *in vivo*.**—*J. Bact.* **57.** 453–457. [Authors' summary copied *verbatim*.] **2859**

Subtilin had a moderate inhibitory effect on the growth of the H37Rv strain of the tubercle bacillus in sorbitan monooleate albumin liquid medium, but very little effect in the other three media that did not contain sorbitan monooleate.

Subtilin did not influence the course of a tuberculous infection in guinea pigs produced by the H37Rv strain of the tubercle bacillus.

SASANO, K. T. (1949.) **A study of the bacteriostatic and bactericidal activity of promin, diasone, sulfathiazole, sulfaguanidine and streptomycin on the H-37V. strain of *M. tuberculosis*.**—*Amer. Rev. Tuberc.* **59.** 461–465. [English and Spanish summaries, English summary copied *verbatim*.] **2860**

From laboratory studies with a streptomycin-sensitive strain of *M. tuberculosis* H-37v. it has been found that: (1) promin and diasone possess both bacteriostatic and bactericidal properties, with promin the more active of the two; (2) sulfathiazole possesses bacteriostatic activity to a high degree without appreciable bactericidal effect; (3) sulfaguanidine has much less bacteriostatic effect than sulfathiazole and is not bactericidal; (4) streptomycin exhibits the greatest bacteriostatic effect but has only slight bactericidal activity; (5) the bacteriostatic effect of streptomycin is not altered by the presence of penicillin.

HOLT, H. D., & CRUICKSHANK, R. (1949.) **A simple method for determining the streptomycin sensitivity of *Mycobacterium tuberculosis*.**—*Mon. Bull. Min. Hlth publ. Hlth Lab. Serv.* **8.** 103–106. [Authors' summary copied *verbatim*.] **2861**

A reasonably quick and accurate assessment of the sensitivity of the strains of tubercle bacilli in the sputum of untreated patients may be obtained by direct cultivation on solid media to which streptomycin has been added, before or after sterilization of the medium, to give a concentration of the drug of 2 to 5 units per ml. The development and degree of drug resistance of tubercle bacilli from patients on streptomycin-therapy may be quickly recognized by direct cultivation of the infected material on solid media containing varying concentrations of streptomycin.

EMMART, E. W., MCCLOSKY, W. T., SMITH, M. I., & LIEBERMAN, J. E. (1949.) **Acquired resistance of *M. tuberculosis* to streptomycin *in vitro* and its behavior in experimental infections.**—*Amer. Rev. Tuberc.* **59.** 438–448. [English and Spanish summaries, English summary copied *verbatim*.] **2862**

The slow growing virulent human strain of tubercle bacilli (A27) has been made resistant to streptomycin by successive passages in Kirchner's medium with increasing concentrations of streptomycin. After 17 passages the degree of induced resistance was from an original sensitivity of 1·0 to 1·5 γ per cc. to a tolerance of 5·0 γ per cc.

The growth of the resistant strain in Kirchner's medium was slower when compared with the control strain. When the growth curves were subjected to statistical analysis it was found that the growth of the resistant strain was retarded on an average by 20 days.

The virulence of the resistant strain was indistinguishable from that of the control strain when tested by the short term technique of inoculation of the chorio-allantois of the chick embryo.

When tested in guinea pigs by intraperitoneal inoculation of 0·25 mg. to 1·0 mg. of tubercle bacilli and terminating the experiments 42 days after infection, the results of three tests showed a slightly reduced tuberculosis index and a higher average weight curve for the animals infected with the resistant strain. In a fourth experiment with 0·5 mg. of tubercle bacilli as the infecting dose with each strain, and the experiment terminated 14 to 15 weeks after infection, the mortality for the group infected with the resistant strain was 60 per cent as compared with 80 per cent for the control group and the tuberculosis index was 9·2 as compared with 12·2 for the controls.

Streptomycin therapy in doses which gave a high degree of protection in animals infected with the control strain was ineffective in infections with the resistant strain.

HOBSON, L. B., TOMPSETT, R., MUSCHENHEIM, C., & MCDERMOTT, W. (1948.) **A laboratory and clinical investigation of dihydrostreptomycin.**—*Amer. Rev. Tuberc.* **58.** 501–524. [English & Spanish summaries, abst. from English summary.] **2863**

Dihydrostreptomycin is a compound derived from streptomycin and has the same range of antimicrobial activity. The authors found that its toxicity differs significantly from that of streptomycin. Both drugs may cause a variety of toxic reactions in human beings when administered over

long periods and when reactions to dihydrostreptomycin occur they are similar to those caused by the parent compound. Dihydrostreptomycin, however, was found to be less neurotoxic than streptomycin. Evidence of vestibular damage appeared later and less uniformly with 5·0 g. of dihydrostreptomycin daily than with 3·0 g. of streptomycin daily. Dihydrostreptomycin was also well tolerated by patients who were hypersensitive to streptomycin.

In the twelve cases of pulmonary tuberculosis reported here, the therapeutic results were judged to be as good as those that have been obtained with streptomycin. Resistant strains of tubercle bacilli emerged during treatment with dihydrostreptomycin in the same fashion as with streptomycin. Highly resistant strains, not inhibited by 1,000 μg. per ml. of one compound, were similarly resistant to the other.

Dihydrostreptomycin, therefore, should prove to be useful in the treatment of patients unable to tolerate streptomycin because of hypersensitivity.

ESPERSEN, E. (1949.) **Morphological studies of the normal growth of a human tubercle strain, and the effects of some antibacterial substances on same.**—*Acta path. microbiol. scand.* **26.** 178–204. [In English, abst. from author's summary.] **2864**

The normal growth of a human type tubercle bacillus was observed in microculture, directly under a cover-glass in a moist chamber on serum-tween-mannitol-sauton-agar [tween is a surface active agent]. Reproduction proceeded by means of transverse fission. Branching occurred rarely. Granules arose from the autolysis of the rods; they did not develop again into tubercle bacilli.

On the strain employed, streptomycin in concentrations of 1–2 units (1 unit = 1 μg) per ml. medium had a bactericidal effect. Concentrations one-quarter to one-half unit were bacteriostatic and bacteriolytic.

Penicillin was bacteriostatic and bacteriolytic. The effect was not considerable below 80 units, but it could be demonstrated down to 5 units per ml. At a concentration of 640 units per ml. primary growth occurred for a day or so, followed by bacteriostasis for about four days, after which a secondary growth of the organism started.

Sulphathiazole was bactericidal in concentrations of 20–40 mg. %. Concentrations of 1–10 mg. % were bacteriostatic and bacteriolytic.

Glycerin was bactericidal in concentrations of 20–30%. At 0·75–10% it was bacteriostatic and bacteriolytic.

As similar morphological changes can be produced by a reduced supply of air (0_2), E. suggests that the effect of these substances may result from action on the respiration of the cells.

GOODACRE, C. L., MITCHELL, B. W., & SEYMOUR, D. E. (1948.) ***Para*-aminosalicylic acid. Part II. The *in vitro* tuberculostatic behaviour of para-aminosalicylic acid and related compounds.**—*Quart. J. Pharm. & Pharmacol.* **21.** 301–305. [Abst. in *Bull. Hyg., Lond.* **24.** 24. (1949), copied *verbatim.* Signed: P. D'ARCY HART.] **2865**

Various derivatives and analogues of *p*-aminosalicylic acid (PAS) were synthesized, and their tuberculostatic activity was tested against H37Rv strain of tubercle bacilli, in Dubos medium and with an inoculum of 0·005 mgm. (dry weight) of bacilli per 5 ml. medium; the necessity of accurate measurement of the size of the inoculum was dictated by the marked effect of changes in this factor on the inhibitory end-point of PAS itself. Under these conditions the inhibitory concentration of PAS was 0·05–0·02 mgm./100 ml.; none of the other synthetic compounds was more active, although the esters of PAS were equally so; simple substitution showed no great promise. The antagonistic activity of the anaesthetic procaine was noted.

GRAESSLE, O. E., & PIETROWSKI, J. J. (1949.) **The *in vitro* effect of para-aminosalicylic acid (PAS) in preventing acquired resistance to streptomycin by *Mycobacterium tuberculosis*.**—*J. Bact.* **57.** 459–464. [Authors' summary copied *verbatim.*] **2866**

Mycobacterium tuberculosis, strain H37Rv, develops resistance to streptomycin *in vitro* when exposed to increasing concentrations of the antibiotic. The streptomycin-resistant strain of H37Rv retained its sensitivity to PAS. Repeated exposure of *M. tuberculosis* to PAS for 120 days failed to produce an increase in the resistance of this strain. The addition of relatively low concentrations of PAS to streptomycin (approximately 0·5 micrograms to 1 unit) prevents or greatly retards the *in vitro* development of streptomycin resistance.

BLOCH, R. G., VENNESLAND, K., EBERT, R. H., & GOMORI, G. (1949.) **The effect of streptomycin, para-aminosalicylic acid (PAS) and their combination on the tubercle bacillus *in vitro* and *in vivo*.**—*Amer. Rev. Tuberc.* **59.** 554–561. [English and Spanish summaries, English summary copied *verbatim.*] **2867**

Streptomycin alone, even in small doses given once a day and for a short period of time, will prevent the progression of tuberculosis in the guinea pig.

Para-aminosalicylic acid alone in large doses has a favorable effect on experimental tuberculosis.

The combination of streptomycin and PAS has a much more favorable effect on experimental

tuberculosis in the guinea pig than either drug used alone.

WILLISTON, E. H., & YOUMANS, G. P. (1949.) **Factors affecting the sensitivity *in vitro* of tubercle bacilli to streptomycin.**—*Amer. Rev. Tuberc.* **59.** 336–352. [English and Spanish summaries, English summary copied *verbatim.*] **2868**

A variety of media, both liquid and solid, have been tested for their suitability for determining the sensitivity of cultures of tubercle bacilli to streptomycin. The effect of Tween 80 [a surface active agent], bovine serum, glycerol, and the amount of inoculum on the sensitivity of cultures of tubercle bacilli to streptomycin was also determined.

It was found that Tween 80, even in low concentration, increased the sensitivity of the majority of cultures to streptomycin. Serum (bovine) increased the rate of growth and decreased slightly the streptomycin sensitivity of some strains. Glycerol increased slightly the resistance of a few strains of tubercle bacilli to streptomycin. In the presence of serum, however, glycerol had no observable effect.

Within the limits tested (0·01 to 0·25 mg. wet weight) the amount of inoculum employed did not affect the sensitivity to streptomycin provided a minimum incubation period of twenty-eight days was used. Large inocula, 0·1 to 0·25 mg., permitted completion of tests within fourteen days.

The sensitivity to streptomycin tended to be slightly less on solid medium than on liquid serum-synthetic medium. Nevertheless, it was felt that a solid medium such as Herrold's glycerol egg yolk agar was satisfactory for such tests and possessed the additional advantage of supplying an approximation of the relative numbers of streptomycin resistant and sensitive tubercle bacilli.

GR NWALL, A., & ZETTERBERG, B. (1947.) **The effect on tubercle bacilli of sulphanilamide derivatives coupled to methyl-naphthoquinone.**—*Upsala l karef. förh.* June 30. p. 199. [Abst. in *Amer. Rev. Tuberc.* **58.** No. 4. p. 31 of absts. (1948), slightly amended. Signed: R. W. CLARKE.] **2869**

The sulphonamides examined were sulphanilamide, sulphapyridine, sulphathiazole, and sulphamethylthiazole. They were coupled to 2-methyl-1,4-naphthoquinone. These were dissolved in various concentrations in Löwenstein medium. Human tubercle bacilli strain No. 1354 in suspensions of 0·05 ml. containing 30 to 60 bacilli were employed for inoculation. Tubes were incubated at 37°C. All four sulphonamides have a bacteriostatic effect; sulphathiazole and sulphamethylthiazole were most effective. The coupled compounds were the less effective. After serial subculturing it was shown that the sensitivity to the respective drugs was not changed. In the presence of sulphathiazolemethylnaphthoquinone, the bacilli became longer and broader, were more diphtheroid, were colored more intensively, and contained greater amounts of nonacid-fast material. Under the electron microscope, it was seen that the bacilli were less dense and characterised by clubbed ends and smaller granules. They were much broader, and the central denser part was surrounded by a wide, capsule-like external zone. These changes appeared to be of an involutionary nature. These experiments seem to support the conception that the compounds of methyl-naphthoquinone play a special role in the development of the morphological changes.

CHEN, G., & SARBER, R. W. (1949.) **Skin tuberculin reaction for the assay of tuberculin in guinea pigs.**—*Amer. Rev. Tuberc.* **59.** 692–700. [Authors' summary copied *verbatim.*] **2870**

An analysis of the dose-response characteristics of the skin tuberculin reaction has been presented. Expressed in logarithms, the dose and the size of the erythema follow a linear relationship. The response, in terms of the area of the skin reaction, is proportional to the cubic root of the dose of tuberculin. Based upon the lineality between dose and response, a statistical procedure has been used for the assay of tuberculin preparations. The relative potency of an unknown is computed from the regression line of a standard preparation. The relative potency is determined in experiments planned in factorial design and evaluated through the analysis of variance.

WELLS, A. Q., & WYLIE, J. A. H. (1949.) **A tuberculin-neutralising factor in the serum of patients with sarcoidosis.**—*Lancet.* **256.** 439–441. **2871**

Old tuberculin was used throughout. One part of a 0·1% saline solution of tuberculin was diluted with nine parts of serum from four patients with sarcoidosis. As controls, dilutions were made with saline, with serum from people having positive or negative Mantoux tests but otherwise in good health, from patients with diseases unrelated to TB. and sarcoidosis, and with sera from other mammalian species. Intracutaneous reactions were compared in a series of patients with skin sensitivity to tuberculin but no TB. The sera from established cases of sarcoidosis nearly always neutralized the tuberculin, though this occasionally happened with apparently normal sera and in conditions unrelated to sarcoidosis. Occasionally serum from a patient

with sarcoidosis did not neutralize the tuberculin. The authors therefore considered the test unsuitable as a routine diagnostic procedure.

Tests with the various electrophoretic fractions of serum protein from an established case of Boeck's pulmonary sarcoidosis revealed that all the tuberculin-neutralizing power resided in the γ-globulin. Normal human γ-globulin had no tuberculin-neutralizing power and the pseudoglobulin and albumin fractions of sarcoid serum possessed little or none.—L. M. MARKSON.

GILL, D. A. (1948.) **Illness associated with lameness in sheep after dipping.**—*Aust. vet. J.* **24.** 297–302. **2872**

This is a record of an investigation of illness, with lameness in some cases, in sheep that had recently been dipped in benzene hexachloride dip. The history of certain affected sheep is given, and details are given of the results of bacteriological work done. *Erysipelothrix rhusiopathiae* was isolated and was considered to be responsible for the trouble. Serological work and infection experiments with the strains isolated are described.

DOLDER, W., & LEUENBERGER, M. (1948.) Quelques considérations sur une grave épizootie chez les moutons (pasteurellose). [**A serious outbreak of pasteurellosis in sheep.**]—*Schweiz. Arch. Tierheilk.* **90.** 656–661. [In French. German summary.] **2873**

Two severe outbreaks were investigated. Onset of symptoms was sudden with death in one or two days. P.M. findings were not typical, but cultures and transmission experiments confirmed the presence of pasteurella. Both outbreaks were associated with the presence of numerous intestinal parasites, and extremely bad weather. The outbreaks were rapidly controlled with an autogenous vaccine, 2–5 ml. containing 4–5 million organisms per ml. being injected subcutaneously, followed by a double dose 14 days later.—G. V. LAUGIER.

COMMUNAL, R. (1945.) La pseudo-tuberculose du chat. [**Pseudo-tuberculosis** (*Pasteurella pseudotuberculosis*) **in the cat.**]—*Thesis, Alfort.* pp. 125. **2874**

A general account of *Pasteurella pseudotuberculosis rodentium* infection in cats, including some personal observations. Authentic reports of the transmission of the disease to man are rare —not more than nine. There is a four-page bibliography.—W. R. BETT.

SIGARS, G. O. (1949.) **Infectious coryza of turkeys (sinusitis or roup).**—*J. Amer. vet. med. Ass.* **114.** 16–19. **2875**

An outbreak of sinusitis was diagnosed in a flock of 2,700 turkeys. Treatment by injection of sulphanilamide or sulphamerazine in oil into the affected sinuses after aspiration of the exudate was compared with treatment by aqueous 15% argyrol or 4% silver nitrate. The latter drugs gave rather better results than sulphamerazine in cod-liver oil. Sulphanilamide was of very little value.—F. D. ASPLIN.

BOHORQUEZ, J. J. (1947.) Incidencias de las "enterobacteriaceas" en el diagnostico bacteriologico. [**Frequency of enterobacteriaceae in bacteriological diagnosis.**]—*Rev. Med. vet., Bogotá.* **16.** 5–14. **2876**

The family, Enterobacteriaceae, includes *Bact. coli*, many coliforms, *Proteus*, *Salmonella* and *Shigella*. Most of the non-pathogens of the family are normal inhabitants of the intestine and some are beneficial in their action on the complex circumstances of the gut. B. examined 334 samples of bones, viscera and milk from various species of animals and found 287 to be infected with two or more types of organism; 162 of these belonged to the family Enterobacteriaceae, ten of which had not previously been described. No tests for pathogenicity were made.

—R. MACGREGOR.

HENRY, R. J., HOUSEWRIGHT, R. D., & BERKMAN, S. (1949.) **Studies on streptomycin. VI. The effect of streptomycin on the metabolism of multiplying bacteria.**—*J. Bact.* **57.** 447–451. [Authors' summary copied *verbatim*.] **2877**

Studies with *Shigella sonnei* showed that coincident with inhibition of multiplication by streptomycin there was inhibition of carbohydrate substrate utilization and inhibition of 0_2 consumption per cell.

Following bacteriostasis of *Bacillus cereus* by exposure to streptomycin, both the total nitrogen content of the bacteria and the total phosphorus decreased, but the total reducing substances increased.

SCHNEIDER, H. A. (1949.) **Nutrition of the host and natural resistance to infection. IV. The capability of the double strain inoculation test to reveal genetically determined differences in natural resistance to infection.**—*J. exp. Med.* **89.** 529–539. [Author's summary copied *verbatim*.] **2878**

The double strain inoculation (DSI) method of testing for natural resistance to infection has been examined in the instance of mouse salmonellosis. The DSI method has been found capable of detecting differences in natural resistance due to genetic as well as nutritional causes.

A difference in response to *Salmonella* infection was found for the first time between the two "susceptible" inbred mouse strains, BSVR and BSVS. Whereas BSVS mice for the most part survived an intraperitoneal injection of 10^3

"avirulent" *S. typhimurium*, BSVR mice all succumbed.

The relationship of the DSI test to the usual single infection test has been discussed and it is suggested that such single infection tests are special cases of the DSI test, since they involve a heterogeneous bacterial population which can be considered as a mixture of cultures of differing virulence and in which, by a single injection, the usual time interval between the two injections of the DSI method has been reduced to 0.

CANTELLO, J. E. (1948.) **Swine dysentery: treatment with neokharsivan, sulphaguanidine, and the apparent protective value of vitamin A.**—*Yearb. Inst. Insp. Stk N.S.W.* 1948. pp. 97–101. **2879**

Of 867 pigs affected with swine dysentery, 794 recovered after intravenous or intramuscular injections of a 20% solution of "neokharsivan" [neoarsphenamine]. Of 90 affected pigs treated with a sulphaguanidine preparation, 82 recovered. Vitamin A supplements were found to have a highly protective value against swine dysentery.—D. F. STEWART.

BENDIXEN, H. C. (1949.) Om smitsom kastning med saerligt henblik på smitteveje og vakcinationsproblemet. [**Infectious abortion in cattle with special reference to the methods of infection and vaccination.**]—*Nord. Vet.-Med.* **1.** 134–162. [Abst. from English summary.] **2880**

An account is given of the course of generalized brucellosis in cattle.

Infection through the mucous membranes of the eye takes place almost constantly when the cattle are exposed even to small numbers of bacteria. Infection through the skin, especially that of the hind legs, tail and udder, occurs readily. These are considered to be the commonest portals of entry.

With regard to infection through the mucous membranes of the genital organs, several cases have been demonstrated in Denmark where infection was spread widely by semen from bulls with vesiculitis, ampullitis, and epididymitis, when such semen was used for artificial insemination of cows in uninfected herds.

The bacilli may be excreted with the faeces and urine, as well as with the milk and semen.

Indirect infection also occurs in a closely settled country such as Denmark.

Immunization with living cultures is discussed.

POLDING, J. B. (1947.) **Brucellosis in India.**—*Indian J. vet. Sci.* **17.** 147–155. **2881**

The results of a survey of brucellosis in India on farms and in villages were analysed in an effort to trace some of the factors which control the spread of the disease.

All farms were found to be more or less infected, the intensity depending upon the character of their foundation stock and the situation of the farm as regards climate. In areas of low rainfall the normal annual abortion rate was 2–3% and about 1% respectively among cross-bred cows and buffaloes, but in farms situated near the rain belts it ranged sometimes from 9·3–12·3% and 2·5–5·9% respectively. Corresponding figures for low and high rainfall areas for indigenous stock in farms were 1% (or less) and 2·5–5% respectively.

Village cattle in the bi- and tri-seasonal rainfall areas (*viz* south, south-east and eastern parts of India) were heavily infected, reactors ranging from 10–50%.

All strains isolated from village cattle were intermediate between *Br. abortus* and *Br. melitensis* in type while most of the strains from farms resembled *Br. abortus* in type. It was therefore surmised that village infection was indigenous while infection in farms was imported with cattle from Europe.

Judging from abortion statistics, suceptibility of cross-bred animals increased with the amount of foreign blood in the animal. The relative expectation of loss of calves of zebu, buffaloes, zebu cattle kept along with but not interbred with cross-bred animals and of cross-bred animals was in the proportion of 1·0 : 1·38 : 2·44 : 6·79.

It appeared that the sterilizing effect of continuous sunlight was paramount in checking dissemination of the disease, while humidity, rainfall and sunlessness were favourable to its spread, in which also unhygienic conditions and overcrowding seemed to play an important part.

Brucellosis was not detected among sheep and among goats it was slight.—V. R. RAJAGOPALAN.

POLDING, J. B. (1947.) **Indian species of brucella.**—*Indian J. vet. Sci.* **17.** 157–163. **2882**

Out of 49 Indian strains of brucella examined, 26 were *Br. abortus*; 3 were *Br. melitensis*; and 20, which had intermediate characters, were termed *Br. abortus/melitensis* (A/M) type. All the six strains isolated from village cattle were A/M, and the *Br. abortus* strains were all from farms which had at one time or other carried European cross-bred cattle. P. surmises the possibility of the aberrant A/M type being a middle-Asian variant since it was encountered in Indonesia also.

—GAJINDAR SINGH.

MAGOFFIN, R. L., KABLER, P., SPINK, W. W., & FLEMING, D. (1949.) **An epidemiologic study of brucellosis in Minnesota.**—*Publ. Hlth Rep., Wash.* **64.** 1021–1043. [Authors' summary and conclusions copied *verbatim*.] **2883**

Available evidence reveals a sharp increase in both human and bovine brucellosis in Minnesota

since the period before World War II. An analysis of the data on 268 human cases demonstrates that *Br. abortus* is the causative organism in about 85 percent of the cases. The remaining infections, divided almost equally between *Br. suis* and *Br. melitensis*, occur chiefly in meat-packing plant employees handling infected swine, though a few cases have occurred in farmers. Several cases of *Br. suis* infection transmitted through cattle are also cited.

Approximately half of all cases occur in individuals whose occupation involves contact with livestock or slaughtered animals, and nearly three-fourths have some contact with farm animals. Adult males between the ages of 20 and 55 comprise the bulk of this group. Raw milk provides the sole source of infection in about one-fourth of all cases. These cases are equally divided between males and females and are distributed more equally through all ages than are the cases with animal contact. These observations suggest that infection occurs more readily through the skin from handling infectious materials than by invasion through the gastro-intestinal tract following ingestion of contaminated milk.

Laboratory data on 267 cases indicates that the agglutinin test is a highly reliable diagnostic aid in active brucellosis. A negative agglutination test in the presence of a positive blood culture was found in a single case.

Prevention of the human disease is dependent upon eradication of the disease in animals. Pasteurization of all milk would prevent infection in many cases, but there appear to be few practical ways of protecting farmers, packing plant workers, veterinarians and others who work with infectious animals. Control measures for bovine brucellosis have proved effective, especially when conducted over a large area, but shortages of personnel have limited the extension of effective area control into the areas having the greatest number of cattle and highest rates of infection. The ultimate control of brucellosis and removal of the menace it holds for the health and economic welfare of large numbers of the population of agricultural States is an important public health problem.

FLEMING, D. S., & ROEPKE, M. H. (1949.) **Relation of human and bovine brucellosis in Minnesota.**—*Publ. Hlth Rep., Wash.* **64.** 1044–1051. [Authors' summary copied *verbatim.*] 2884

During the period 1937–47, the reported rate of human brucellosis has increased 4 to 10 times in districts of Minnesota not under the area plan of bovine brucellosis control. No appreciable increase occurred in a district of 21 counties under the area plan.

During the same period, fluctuations in the cattle population occurred in similar proportions in all these districts.

The area plan of bovine brucellosis control in Minnesota appears to produce considerable benefit to the public's health.

HARRIS, H. J. (1949.) **Chronic brucellosis. The unsatisfactory status of current diagnostic methods.**—*Amer. J. publ. Hlth.* **39.** 870–874. [Author's summary slightly amended.] 2885

The available tests are inadequate for uniformly accurate diagnosis of brucellosis [in man], especially of the chronic form. A more sensitive and comprehensive test is needed. It is to be hoped that a complement-fixation reaction for brucellosis can be developed that will fill this need. Present laboratory methods are often unsatisfactory for the diagnosis of chronic brucellosis [in man], as to sequence in which performed, technique and interpretation.

CASTANEDA, M. R. (1947.) **Studies on the pathogenesis of brucellosis.**—*Proc. Soc. exp. Biol., N.Y.* **64.** 298–302. 2886

G. pigs and rabbits were inoculated intravenously and into the testicle and mice intravenously and intranasally with strains of *Brucella abortus* and *Br. suis*. Five days later brucella were found in large numbers in macrophages, fibroblasts, the endothelial and reticular cells of the spleen, the parenchymatous cells of the kidney and interstitial cells of the testis. Extracellular organisms were usually in zones where there were considerable numbers of polymorphs.

C. suggests that multiplication of the organism is chiefly intracellular except where the tissues have been damaged, when large numbers of brucella are extracellular.—J. I. TAYLOR.

METZGER, H. J., & SHUART, C. E. (1948.) **Adult and calfhood vaccination for control of brucellosis.**—*Bull. N.J. agric. Exp. Sta.* No. 741. pp. 3–19. [Authors' summary slightly amended.] 2887

Administration of strain 19 vaccine to negative adults in the herd which was in the midst of a brucellosis outbreak did not ensure all vaccinated animals against becoming spreaders of the infection. *Br. abortus* was isolated from 14 of 22 cows that were added to the "probably infected" list after they had been vaccinated while showing negative blood titers.

Administration of the vaccine to negative adults in the herd which was in the midst of an outbreak of brucellosis did not ensure all vaccinated animals against aborting because of *Br. abortus* infection. Following use of the vaccine on the herd, 13 cows that were vaccinated while showing negative blood titers aborted.

Analysis of the performance of the two groups

of cows that received the 0·2- and the 0·04-ml. doses of vaccine respectively indicates that where the vaccine is to be used on adults in a highly infected herd the smaller dose is to be preferred.

Best results from the use of the vaccine, measured in terms of breeding performance and blood titer studies, were obtained in the group of 12 cows that were vaccinated intradermally, while in advanced pregnancy, with 0·02 ml. of vaccine and then revaccinated intradermally, after calving, with a larger dose of the vaccine.

CARRÈRE, L., & MOUSTARDIER, G. (1948.) Étude du mode d'action de l'antigène glucido-lipidique des *Brucellae* chez le cobaye. **[Mode of action of a gluco-lipoid *Brucella* antigen in g. pigs.]** —*Rev. Immunol. Thérap. antimicrob.* **12.** 362–368. **2888**

A gluco-lipoid antigen prepared from *Br. melitensis*, type S. (H.105), was injected subcutaneously into three pairs of g. pigs in the following doses :– first pair : 10 injections of 0·2 ml. daily ; second pair : 8 injections of 0·6 ml. and 0·8 ml. at three day intervals respectively ; and the third pair : 2 injections of 1 ml. at five days' interval.

After these injections there was a loss in weight in five of the six g. pigs. Agglutination titres ranged from 1 : 20 to 1 : 160. In one g. pig only was there a reaction to the intradermal test, while there were no reactions to the intracorneal test.

When the remaining g. pigs had returned to their pre-inoculation weight one of each pair was given a test dose of one million living virulent organisms applied to the scarified skin of the flank. In all three there was an acute systemic reaction ; all became thin and developed arthritis. Twenty days after inoculation the titres ranged from 1 : 80 to 1 : 160 and two months later the titres ranged from 1 : 40 to 1 : 160. Intradermal tests were positive in all three.

P.M. examination of these three g. pigs revealed intense congestion of all organs, enlargement of lymph nodes, fatty degeneration of the liver, pleurisy and multiple abscesses. These lesions were comparable to those in nine control g. pigs which received only the test dose. Thus no durable immunity was conferred.—J. I. T.

PAILLE, R. (1947.) Tularémie du lièvre. Premiers cas identifiés en France chez les animaux. **[Tularaemia of the hare. First cases identified in animals in France.]**—*Bull. Acad. vét. Fr.* **20.** 97–102. **2889**

A hare found dead was proved to be infected with *Br. tularensis*. An inquiry revealed that six other hares had been found dead in the neighbourhood and that a man had been ill after eating one. The origin of the infection was uncertain, but the carcasses of imported hares were suspected.

—J. I. TAYLOR.

WATERS, G. G., & MOLONEY, P. J. (1949.) **The effect of antitoxin on experimental infection with *Clostridium novyi* (*oedematiens*) in guinea pigs, with a note on active immunization.**—*Canad. J. Res.* Sect. E. **27.** 171–176. [Authors' abst. slightly amended.] **2890**

Cl. oedematiens antitoxin injected in divided doses (total 500 units) over a period of 12 days was more effective in saving guinea pigs inoculated with spores of *Cl. oedematiens* than was the same total amount of antitoxin given in one dose. Of the infected animals, 60 to 80% could be saved by treatment with divided doses of antitoxin up to 12 hr. after inoculation with spores. If, however, treatment was deferred for 24 hr., none of the animals could be saved. Preliminary results on active immunization with *oedematiens* toxoid indicate that a relatively high titer of antitoxin (in the order of 1μ per ml.) is required to protect guinea pigs against inoculation with *oedematiens* spores suspended in calcium chloride solution.

PILLEMER, L., WITTLER, R. G., BURRELL, J. I., & GROSSBERG, D. B. (1948.) **The immunochemistry of toxins and toxoids. VI. The crystallization and characterization of tetanal toxin.**—*J. exp. Med.* **88.** 205–221. [Authors' summary copied *verbatim*.] **2891**

Methods for the purification and crystallization of tetanal toxin are described. The methods consist of the multiphase fractionation system involving methanol as the organic, precipitating agent under controlled conditions of pH, ionic strength, protein concentration, and temperature.

Crystalline tetanal toxin has an electrophoretic mobility of $2{\cdot}8 \times 10^{-5}$ in veronal buffer of 0·1 ionic strength of pH 8·6. The solubility of freshly prepared toxin is essentially constant. The isoelectric point is $5{\cdot}1 \pm 0{\cdot}1$. The crystalline toxin contains 1 per cent sulfur, traces of phosphorus, and gives the usual protein reactions. It does not contain carbohydrate.

The crystalline toxin does not precipitate anti-*Clostridium tetani* rabbit serum. The final product contains between 3400 and 3600 Lf and about $6{\cdot}6 \times 10^{7}$ M.L.D. per mg. N.

Crystalline tetanal toxin is spontaneously converted to a flocculating atoxic dimer [a twofold polymer modification] upon standing at 0°. This change is accompanied by the appearance of another molecular species as judged by constant solubility tests. Ultracentrifugal analysis of these fractions reveals that tetanal toxin has a sedimentation constant of 4·5 Svedberg units while the atoxic flocculating dimer sediments at 7 S.

GEURDEN, L. (1944.) Beschouwingen over aetio-pathogenese en voorbehoeding van Botulisme bij paarden. [**Aetiology, pathogenesis and control of botulism in horses.**]—*Vlaam. Diergeneesk. Tijdschr.* **13.** 30–33. [English, French & German summaries.] **2892**

The author discussed preventive measures against botulism. He stated that contaminated forage was particularly liable to become toxic if molasses had been added to it, the conditions necessary for toxin production being present. He stated that affected forage, particularly oats and peas, could be fed to animals if previously boiled. —E. G.

DOWDING, E. S. (1947.) **The pulmonary fungus, *Haplosporangium parvum*, and its relationship with some human pathogens.**—*Canad. J. Res.* Sect. E. **25.** 195–206. **2893**

In a survey of the lungs of 275 wild rodents in Alberta, fungi resembling *Coccidioides immitis* but proved to be non-pathogenic were found in those from one white-footed deer mouse (*Peromyscus maniculatus borealis*) and one harvest mouse (*Reithrodontomys humulis*). The fungi were considered to be non-pathogenic geotricha.

In the lungs of 13 white-footed deer mice and one red squirrel (*Sciurus hudsonicus baileyi*) pearl-like bodies were present and *Haplosporangium parvum* was isolated from seven of the white-footed deer mice and from the red squirrel. Histological examination proved that the pearl-like bodies were fungous cells. The author's conclusions are as follows :– " *Haplosporangium parvum* is certainly a Phycomycete. In the writer's opinion it closely resembles *Chaetocladium*. The human pathogens mentioned above, although not showing the morphological features of the Lower Fungi so clearly, resemble *H. parvum*. It is quite possible that all the fungi under discussion constitute a natural group." —J. F. FRANK.

REWELL, R. E., & AINSWORTH, G. C. (1947.) **Occurrence of *Aspergillus fumigatus* Fresen. in the lung of an American bison. [Correspondence.]**—*Nature, Lond.* **160.** 362–363. **2894**

An American bison (*Bison bison*) in a zoological garden had a cough and shortness of breath for several years and died following an acute exacerbation of these symptoms. All the air passages from the larynx to the smallest visible bronchioles were lined with a thick, green-grey felting. *Aspergillus fumigatus* was isolated in pure culture.—M. C.

LEWIS, E. F. (1947.) **Penicillin therapy in actinomycosis in cattle.**—*Vet. Rec.* **59.** 485. **2895**

A brief note of six cases of bovine clinical actinomycosis involving the upper and lower jaws. Penicillin, in aqueous solution or oil and wax emulsion, was injected into several sites over the enlarged areas in doses totalling 1–2 million units. The enlargement disappeared in ten days to four months and there were no relapses. L. concludes that early disseminated injections into the actual lesion are of value and that oily suspensions have no advantage over the more easily injected and diffused aqueous solutions.—M. WOODBINE.

BORGEN, L. O. (1948.) **Infection with *Actinomyces muris ratti* after a rat bite.**—*Acta. path. microbiol. scand.* **25.** 161–166. [In English. Abst. from author's summary.] **2896**

A laboratory assistant developed signs of lymphangitis and lymphadenitis shortly after being bitten by a laboratory rat. Six days after the accident the patient developed fever which subsided after combined sulfathiazole and penicillin treatment. *Streptobacillus moniliformis* (*Actinomyces muris ratti*) was isolated from blood cultures taken before starting the treatment. A positive result to the agglutination test at 1 : 80 was obtained 12 days after the onset of fever. No previous case of infection after a rat bite has been described in Norway, nor probably in Scandinavia.

MCNEIL, E., HINSHAW, W. R., & KISSLING, R. E. (1949.) **A study of *Borrelia anserina* infection (spirochetosis) in turkeys.**—*J. Bact.* **57.** 191–206. [Authors' summary copied *verbatim*.] **2897**

Two strains of spirochetes, isolated from two outbreaks in turkeys in California, have been studied over a period of 2 years. They are the first strains of avian spirochetosis reported in North America. From morphological studies, as well as from animal inoculation experiments, they have been identified as *Borrelia anserina*.

Turkey poults have been infected by oral, intraorbital, nasal, rectal, intraperitoneal, intramuscular, and subcutaneous routes. They have also been infected by ingestion of bile-stained feces from a field outbreak.

The spirochetes will survive in the tissues of birds stored at 32 F for 31 days.

The enlarged, mottled spleen (2 to 4 times normal size) and the greenish mucoid enteritis are pathognomic of this disease in turkeys, although a positive diagnosis depends on finding the organisms in the blood or tissues. Histopathological studies are reported in the text.

The mortality produced by these strains in young chickens and in turkey poults corresponds to that reported in chickens from other parts of the world. The mortality in older birds is lower, although morbidity may be high.

The morbidity in the field outbreak in adult turkeys reported in this paper varied in different pens from 5 to 20 per cent.

Cross-infection experiments proved chickens, turkeys, and pheasants to be susceptible, and rabbits, rats, lambs, and lizards to be resistant to infection.

No ticks, lice, or mites were found in either of the field outbreaks, nor have they been present at any time in the laboratory experiments. Mosquitoes were present at the time of the second field outbreak and may have introduced the infection from migratory birds. Blood smears from 125 blackbirds killed in infected yards were negative for spirochetes.

Agglutinins are produced by this spirochete.

Penicillin proved effective in a single dose of 10,000 units when given intramuscularly to infected birds from 6 weeks to 12 months of age. Streptomycin did not prove to be effective. Neoarsphenamine and mapharsen were no more effective than penicillin.

I. BERNKOPF, H. (1946.) **Experimental work on leptospirosis in cattle and man in Palestine.**—*Harefuah.* **30.** 109–110. [In Hebrew. Abst. from English summary.] **2898**

II. UNGAR, H. (1946.) **Necropsy findings in young calves following experimental infection with a bovine strain of leptospira.**—*Ibid.* 111–113. [In Hebrew. Abst. from English summary.] **2899**

I. Dogs, field mice, and pigs have been shown to be carriers of leptospira pathogenic for man. Cattle may also serve as a source of severe human infections with leptospira. A disease of cattle in Palestine which was first described by FREUND, *et al.* (1942) was shown to be caused by a leptospira. A similar disease of cattle has been reported by MICHIN & AŽINOW [*V. B.* **7.** 419.] who established a leptospira as the aetiological agent in 1935. The strain of leptospira isolated by B. was serologically and in pathogenicity different from *L. icterohaemorrhagiae* and *L. canicola.* In a number of severe human cases of jaundice with early kidney involvement, as evidenced by a high blood urea value, antibodies against the locally isolated leptospira strain were eventually demonstrated in the blood. Since then, leptospira had also been demonstrated by other workers in Levaditi stained sections of liver and kidney of a number of fatal human cases. All patients had callings which brought them into intimate contact with cattle.

The cattle disease was experimentally transmitted to calves and the clinical and pathological findings in these animals were studied. A number of infected animals developed jaundice and died. Other calves developed only a light form of the disease, characterized by fever, leucocytosis and high urea values, and recovered quickly. Even these light cases excreted leptospira in the urine for a considerable time after recovery. Besides cattle, sheep and goats also seem to be susceptible to the disease.

II. Nine calves were examined at different periods after inoculation with the bovine leptospira described in the preceding paper of Bernkopf. The animals were grouped according to the clinical course and outcome of the disease:

In Group 1 the animals died severely jaundiced within 2–3 days following the onset of the disease. The liver showed severe degeneration of the hepatic cells and cholangitis with retention of bile in the bile ducts; there was evidence of erythrophagia and hemosiderosis in the Kupffer cells. The kidneys were affected by a moderate, non-purulent, interstitial inflammation. In one instance there was evidence of hemoglobin resorption by the epithelium of the convoluted tubules.

Group 2 included animals that were only slightly ill for a few days without being jaundiced. Three calves in this Group killed a week after the return of temperature to normal had no marked changes in the internal organs. A fourth animal of this Group killed 54 days after inoculation had severe interstitial nephritis with areas of suppuration.

Group 3 included animals dying after a protracted illness without being jaundiced. There was degeneration of the central cells of the lobules and chronic cholangitis. In one animal the spleen showed considerable hemosiderosis. The kidneys were affected by interstitial nephritis of a moderate degree as well as by focal necrosis of the tubular epithelium.

Leptospira were found sparsely distributed in the liver and kidney of the calves in Groups 1 and 3. The kidney affected by severe interstitial nephritis in the Group 2 calf contained leptospira in the tubules and interstitial tissue in larger numbers than seen in animals during the acute stage. This observation seemed to support the opinion of the Russian authors that the disease may spread following contamination with infected urine from animals that have recovered clinically.

From the P.M. findings, no definite conclusion was possible in favour of a pure hepatogenic or of a hemolytic mechanism of jaundice, although the latter seemed more likely.

MCINLAY, J. N. (1949.) **Methods of diagnosis of leptospirosis in dogs.**—*M[ich.] S[t.] C[oll.] Vet.* **9.** 33–38. **2900**

A conventional account of the disease is given. It is stated that the determination of the blood urea level is a useful diagnostic procedure in canine leptospirosis.—A. R. JENNINGS.

BRUNNER, K. T., & MEYER, K. F. (1949.) **Streptomycin in the treatment of leptospira carriers. Experiments with hamsters and dogs.**

—*Proc. Soc. exp. Biol., N.Y.* **70.** 450–452. **2901**

Penicillin is only effective in leptospiraemia, not in the organs; streptomycin either prevents the leptospira reaching the renal tubules or is able to destroy them there. The authors describe attempts to find whether leptospira, multiplying in the renal tubules of chronic carriers, could be reached and destroyed by streptomycin.

Of 36 hamsters, inoculated intraperitoneally with *L. canicola* (0·25 ml. 120,000 per c.mm.) and treated with intramuscular penicillin, 18 were renal carriers at 32–37 days while the other 18, treated with 5 mg. streptomycin in oil and wax intramuscularly for three days had sterile kidneys.

Dogs infected intraperitoneally with *L. canicola* (50 × 10^6 organisms per kg.) were carriers at 18 days, but the urine became negative after four daily doses of 40 mg. per kg. of streptomycin. The dogs were killed and kidney material was injected intraperitoneally into hamsters which also remained negative for *L. canicola*. Similar results were obtained in dogs infected with *L. icterohaemorrhagiae*.

The authors conclude that, although penicillin and streptomycin influence leptospiraemia in experimental animal infections, only streptomycin is effective against organisms found in the convoluted tubules. Penicillin is of little value in canine leptospirosis. Streptomycin in oil and wax, daily, in doses of 40 mg. per kg. administered intramuscularly should be used for acute and chronic canine infection and for prevention in breeding dogs.—Malcolm Woodbine.

Nielsen, O. P., & Hertel, E. (1945.) **Leptospirosis sejroe. A clinical survey based on 29 cases.**—*Acta med. scand.* **120.** 384–398. [Abst. from authors' summary.] **2902**

Twenty-nine cases of leptospirosis of the sejroe group are recorded in human beings (*L. sejroe*, *L. saxboebing* and a third type not yet isolated). The infection is considered to originate from mice. The symptomatology of the disease and differential diagnosis are discussed.

Nikolaev, I. I. (1947.) **[The morphology of leptospira.]**—*Zh. Mikrobiol. Moscow.* No. 8. pp. 68–72. **2903**

N. describes the results obtained by microscopic examination of leptospira under direct sunlight using dark-ground illumination. This new method gave a far clearer outline and demonstrated that the motor organs consist of two discs at each extremity rotating with a corkscrew-like action, akin to a ship's propeller; it is stated that this provides leptospira with the capacity to penetrate tissues so effectively.

The morphology of various species is described. Fission was observed to occur transversely in 30–40 min. A table of the specific properties of *Leptospira icterohaemorrhagiae* is given.—J. T. G.

Kingma Boltjes, T. Y. (1948.) **Function and arrangement of bacterial flagella.**—*J. Path. Bact.* **60.** 275–287. [Author's summary copied *verbatim*.] **2904**

Flagella are the true organs of locomotion of the rigid bodies of bacteria and not, as Pijper asserts, useless slime appendages.

There is no reason to suppose that peritrichous flagella as demonstrated by flagella staining are artefacts. Hence the distinction between peritrichous and polar flagella may still be considered a characteristic of systematic value.

Williams, R. P., & Koser, S. A. (1947.) **Bacterial destruction of thiamine.**—*J. infect. Dis.* **81.** 130–134. **2905**

Some bacteria from soil and water, isolated by repeated subculture on to a thiamine-inorganic salts medium, were capable of slow growth in the absence of any organic carbon source other than thiamine, and under these conditions thiamine was slowly destroyed; addition of glucose or glycerol to the medium promoted growth, but partially checked thiamine destruction. Thirty-one stock laboratory cultures failed to grow in a thiamine-inorganic salts medium even when other vitamins were added; in nutrient broth or with other sources of carbon available, growth occurred but no destruction of thiamine.—R. Marshall.

Maass, E. A., & Johnson, M. J. (1949.) **Penicillin uptake by bacterial cells.**—*J. Bact.* **57.** 415–422. [Authors' summary copied *verbatim*.] **2906**

Yeast cells equilibrated with equal volumes of penicillin G solutions of varying concentrations do not absorb penicillin, nor does penicillin penetrate the cell wall.

When *Staphylococcus aureus* cells are similarly equilibrated, two types of uptake occur: (1) a specific uptake of 0·8 units per ml that is independent of the extracellular penicillin concentration, and (2) a diffusion of penicillin into the cell so that the intracellular water has the same penicillin concentration as the extracellular water. Uptake is independent of the time of equilibration.

Radioactive penicillin of high specific activity was employed to demonstrate the firmness with which the penicillin specifically absorbed is bound. Neither extensive washing nor equilibration with solutions of nonradioactive penicillin containing 10,000 units per ml released bound radioactive penicillin from the bacterial cells.

Calculations showed that 750 molecules of penicillin per bacterial cell were specifically absorbed.

See also abstr. **2955, 3059** and **3083** (TB.); **3008** (airborne infection); **3032-3034** and **3091** (penicillin, streptomycin); **3073** (foal septicaemia); **3076-3077** (technique).

DISEASES CAUSED BY PROTOZOAN PARASITES

FAIRBAIRN, H., & CULWICK, A. T. (1949.) **The differentiation of the polymorphic trypanosomes.**—*Ann. trop. Med. Parasit.* **43.** 90–95. **2907**

From statistical analysis of data obtained by morphometric examinations of both blood and metacyclic forms of the polymorphic trypanosomes, the authors claim to be able to distinguish *T. gambiense*, *T. rhodesiense* and two distinct types of *T. brucei*. Measurements were obtained by using a camera lucida and the results are given in a table.—FERGUS S. MCCULLOUGH.

KRANEVELD, F. C., & MANSJOER, M. (1947.) Onderzoekingen over bloedparasieten. III. Een infectie met trypanosomen bij Columba livia (Columba domestica). **[Blood parasites. III. *Trypanosoma* infection in *Columba livia* (*Columba domestica*).]**—*Ned.-Ind. Bl. Diergeneesk.* **54.** 249–253. [English summary.] **2908**

More than 1,000 domestic pigeons in the Dutch East Indies were examined and only in four were trypanosomes demonstrated. Morphologically they differed considerably from the species described by von Prowazek in Sumatra. The parasites appeared to be non-pathogenic. Twenty-five specimens were measured and the results are tabulated.—E. G.

MACE, D. L., OTT, R. L., & CORTEZ, F. S. (1949.) **Treatment of surra with para-arsenosophenylbutyric acid.**—*Bull. U.S. Army med. Dep.* **9.** 387–391. **2909**

During World War II surra (*Trypanosoma evansi* infection) caused considerable disability in U.S. Army animals. There is no effective method of treatment. In infected rats and dogs *p*-arsenosophenylbutyric acid, given intravenously or intraperitoneally at 24-, 48- and 72-hour intervals (total of 10 doses), failed to prevent recurrence of blood-stream infections with doses below 3·5 mg. per kg. body weight. Larger doses approached the lethal range.—W. R. BETT.

I. BLOMMAERT, M. (1948.) Traitement de la maladie du sommeil du bétail au bromure de dimidium. **[Dimidium bromide in treatment of bovine trypanosomiasis.]**—*Bull. agric. Congo belge.* **39.** 663–668. **2910**

II. GUYAUX, R. (1948.) Observations cliniques sur l'emploi en milieu indigène du bromure de dimidium dans un milieu actif de trypanosomiase bovine. **[Clinical observations on cattle treated for trypanosomiasis with dimidium bromide.]**—*Ibid.* 668–671. **2911**

I. Field trials on the control of bovine trypanosomiasis with dimidium bromide [2 : 7 -diamino-9-phenyl-10-methyl phenanthridinium bromide] are described. A total of 111 animals, carrying pure or mixed *Trypanosoma congolense* or *T. vivax* infections, were treated, 20 of them being kept under continuous close observation with regular laboratory examinations. The concentration of the drug varied from 0·5–3% and dosages were normally 1 or 2 mg. per kg. body weight. B. concluded that, injected intravenously, a dose of 2 mg. per kg. is more effective than 1 mg. per kg. Higher doses may be dangerous, and subcutaneous injections tend to produce an acute local reaction. Photosensitization may occur in light-skinned animals. Relapses are rare, and the drug appears to be more effective against *T. vivax* than against *T. congolense*.

II. An outbreak of trypanosomiasis in cattle in Uvira Territory in the Belgian Congo was diagnosed, *T. congolense* being incriminated. Symptoms included high temperature, weakness, staggering gait, decubitus, and rapid death. Preliminary examinations of blood samples showed an incidence of 15·41% amongst 558 animals. Dimidium bromide in 2·5% solution was given intravenously or subcutaneously at dosages of 1 mg. per kg. body weight for a primary infection and 2 mg. per kg. after a relapse. The drug was well tolerated, although the subcutaneous injections caused a local oedematous reaction which was absorbed, without abscess formation, in 6–8 weeks. No photosensitization was observed. All the affected animals were treated, and, although at the peak of the epidemic the incidence rose to 18·26%, only nine deaths occurred from trypanosomiasis; five more animals were slaughtered, three of them in an advanced state of the disease. Deaths stopped rapidly after treatment commenced, and the epidemic came to an end in January, 1948, after a duration of six months. Infected *Glossina* had evidently died out during this period and newly emerged flies did not pick up the infection from treated animals. Relapses (7·84% of the treated animals) were completely cured by a second treatment.—E. P. POLLARD.

JUSSIANT. (1948.) Traitement de la trypanosomiase à " Trypanosome congolense." **[Treatment of *Trypanosoma congolense* infection.]**—*Bull. agric. Congo belge.* **39.** 639–642. **2912**

In cattle, horses and donkeys imported into the Belgian Congo from the Cameroons there was a very high incidence of trypanosomiasis caused by *Trypanosoma congolense* and *T. vivax*. The results of control experiments with tartar emetic and antrypol [suramin] are summarized. Daily doses of 0·75 or 1 g. tartar emetic to a total of 5 g. are rapidly fatal to cattle, and it is necessary to use less than 0·5 g. Toxicity appears to result from the trypanolytic action of the drug rather

than from individual susceptibility, and with heavily infected animals it is not advisable to exceed 0·3 g. Detoxication may be effected by intravenous injection of 4 g. sodium hyposulphite, and glucose injections assist recovery. A dose of 0·3 g. tartar emetic plus 3·0 g. antrypol is superior to antrypol alone for trypanosomiasis in horses, and a similar combination (0·3 g. tartar emetic with 5 g. antrypol) is recommended for cattle. Atoxyl [sodium *p*-aminophenylarsonate] does not appear to have any trypanolytic action, but its general tonic effect on the nervous system is useful for maintaining the condition of an affected animal; and drugs such as antrypol are necessary for the treatment of *T. congolense* infections. Tryparsamide is very effective for nervous forms of trypanosomiasis, but an appended note, dated a year later, warns against the use of this drug in combination with antrypol. Injections of combined tartar emetic and antrypol five days after treatment with tryparsamide are fatal, although, by analogy with human medicine, a reversal of this procedure might be safe.—E. P. P.

RANQUE, J., RANQUE, M., CABASSU, J., & CABASSU, H. (1948.) Le diagnostic précoce de la leishmaniose canine par la ponction ganglionnaire. Réflexions à propos de soixante examens positifs obtenus en dix mois dans la région marseillaise. **[The early diagnosis of canine leishmaniasis by gland puncture: 60 positive results in ten months in the Marseilles region.]**—*Bull. Acad. Nat. Méd.* **112.** 339–340. [Abst. in *Trop. Dis. Bull.* **45.** 883. (1948), copied *verbatim.* Signed H. J. O'D. BURKE-GAFFNEY.] **2913**

Gland puncture in dogs can be carried out on a large scale, it is easy to perform, is acceptable to dog-owners, gives a satisfactory percentage of positive results and allows a very early diagnosis of canine leishmaniasis to be made before the clinical manifestations are clear.

In 94 dogs examined in the Marseilles area in 10 months, only 40 were clinically suspicious of leishmaniasis, and 6 were completely asymptomatic. Gland puncture revealed 60 positive, 29 negative and 5 doubtful results. In 46 formol reactions carried out in parallel, only 15 were frankly positive, 30 were negative and one was doubtful. In two dogs, leishmania were found in skin smears and in four others they were found at autopsy in the bone marrow, liver and spleen. The full results will be published later, but the authors make the following observations:–

(1) Gland puncture gives the most significant results in the early stages of the disease, before the formol reaction or the clinical features are diagnostic.

(2) When the disease is established, the furfuraceous dermatitis and the positive formol reaction make the diagnosis simple: but leishmania are far fewer in the glands and prolonged search may be required before they are found: if gland punctures are persistently negative, resort is had to smears from the skin, marrow, liver or spleen.

(3) In the final stages, the leishmania seem to be lysed in the glands, liver and spleen, but persist intact in the bone marrow in large numbers.

(4) In 20 cases where a particularly early diagnosis was made by gland puncture, in the absence of any suspicious skin lesion, antimony treatment suddenly resulted in the appearance of the characteristic furfuraceous dermatitis and a spontaneous deterioration in the general condition: this new phenomenon is regarded as being analogous to the Herxheimer reaction in syphilis.

(5) Gland puncture has a prophylactic value, as it allows serial diagnoses to be made at the earliest stages when the disease is probably most contagious.

(6) Canine leishmaniasis is still as endemic around Marseilles as it was when PRINGAULT described it in 1914.

HOLIAN, W. E. (1948.) Trichomonaden in Urethra und Diverticulum suburethrale bei weiblichen Rindern. **[Trichomonas infection of the urethra in cows.]**—*Inaug. Diss., Munich.* pp. 39. **2914**

Reinfection of cattle cured of trichomoniasis may be attributable to the fact that there may have been trichomonads in out-of-the-way corners of the genital organs in the cases dealt with by H. in the diverticulum suburethrale and in the female urethra, which were not affected by treatment and may thus have caused a fresh spread of the disease. The sexual organs of 186 cattle were examined for the presence of trichomonads and in 21 of these cases live trichomonads were found. Among these 21 positive cases live trichomonads were found 19 times in the diverticulum suburethrale. They were found more frequently there than in other sections of the genital tract, such as uterus, vagina and urethra. H. considers that the diverticulum suburethrale is one of the main places in which trichomonads settle. In seven of these 21 positive cases trichomonads were found in the diverticulum suburethrale or in the urethra [there is some discrepancy as the uterus is mentioned in another part of the text—para. 2. p. 25], whereas no flagellates were found in the mucus tests taken from the uterus and vagina. It was found that where pathological-anatomical phenomena were present there was an increase in the number of trichomonads, from which it may be concluded that a predisposing cause is favourable to their spread. The fact that trichomonads

may occur in the genital tract without any pathological phenomena, and even in pregnant cows without having caused abortion, emphasizes the opinion held by many writers that trichomonads are not necessarily always pathogenic. The possibility that trichomonads may settle in the diverticulum suburethrale and female urethra suggests the advisability of giving cows affected with trichomonad disease an easily applied treatment of these parts, after injection of the uterus or vaginal irrigation.—C. Horton Smith.

Bartlett, D. E. (1949.) **Procedures for diagnosing bovine venereal trichomoniasis and handling affected herds.**—*J. Amer. vet. med. Ass.* **114.** 293–305. **2915**

B. summarizes present knowledge concerning the pathogenesis, pathology, and symptoms of trichomoniasis, and deals at length with techniques for the demonstration of *Tr. foetus* in the genital exudate of bulls and cows. In both cases a pipette is used and the material, if it cannot be examined immediately, is diluted with saline and kept in a cool place. Material for examination is removed from the superficial sediment.

Methods of herd treatment are described, the procedure of choice being artificial insemination.
—G. M. Urquhart.

Schneider, E. (1948.) Untersuchungen über Diagnose, Lokalisation, Therapie und Übertragung von Trichomonas foetus bei Zuchtstieren. **[Diagnosis, localization, treatment and transmission of *Tr. foetus* in stud bulls.]**—*Schweiz. Arch. Tierheilk.* **90.** 503–524, 543–565. **2916**

The diagnosis of *Tr. foetus* in bulls by cultivation of the organism is described. A medium containing serum broth covered with paraffin and 1,000 Oxford units of penicillin to prevent bacterial growths is suggested. The sheath is rinsed with 100 ml. of physiological saline solution and 50,000 Oxford units of penicillin are added. The solution is then centrifuged and the sediment examined microscopically and used for the preparation of cultures. By this method 89 tests were carried out on 47 bulls. In 19 trichomonads were demonstrated. In eleven of the 19 bulls diagnosis was made by culture test alone. Cultures should be prepared the same day the samples are taken. The results were supported by clinical symptoms in served cows.

P.M. the genital organs of ten infected bulls were examined. *Tr. foetus* was demonstrated in the mucosa of the prepuce and the penis by culture. Attempts to cultivate the parasite from testes, epididymis, seminal vesicles, prostate, urethra and bladder failed.

Two out of five bulls recovered when treated with bujarival ointment, consisting of 0·725% of acridine dye in a water-soluble base.

Trypaflavine and chloramine killed the parasites *in vitro* within 30 seconds, but increased the number of parasites in the sheath when used *in vivo*.

Transmission experiments from bull to cow and *vice versa* were carried out successfully.—E. G.

Kerr, W. R., McGirr, J. L., & Robertson, M. (1949.) **Specific and non-specific desensitisation of the skin in trichomonas sensitive bovines.**—*J. comp. Path.* **59.** 133–154. **2917**

Desensitization was produced by the passage of time, after the production of pyometra, and by intramuscular and intra-uterine injections of antigen. A non-specific desensitization also occurred at parturition and after the injection of sphingomyelin and adrenal-cortical hormone.

When desensitization occurs the blood picture shows a characteristic drop in the lymphocytes and a rise in the neutrophiles. This change is discussed in relation to desensitization.
—G. M. Urquhart.

Jacquette, D. S. (1948.) **The duration of *Trichomonas gallinae* infections in individually housed pigeons.**—*Proc. helminth. Soc., Wash.* **15.** 72–73. **2918**

Subclinical infections with *Tr. gallinae* were persistent in a flock of pigeons confined in a small cement-floored house. Twenty-nine naturally infected birds were kept under observation for periods ranging from 228–744 days. One bird was still infected on the 744th day whereas the rest had lost their infections. In order to determine the duration of the infection in individually housed birds observations were made on two of the 29 birds so housed. These observations together with those on seven additional birds are described. A cock was examined ten times during a period of 670 days while housed with infected birds. Seven examinations were positive and the last three negative. To determine whether or not a low-grade infection persisted the cock was housed individually for 61 days. Ten examinations proved negative for *Tr. gallinae*. The mate of this cock proved positive on all the nine examinations made during the 670 days it was housed with infected birds. After this it was housed individually for 61 days. Of the six examinations made the first two were positive and the next four were negative. At the end of their isolation these birds were allowed to mate and both proved negative during the period of union, and, further, the pair raised three clutches of squabs free from infection. Seven three-month-old pigeons with naturally acquired subclinical infections were housed individually for 396 days

and examined approximately once a week. Three of these birds were positive on all examinations, one was positive on all but one examination and one was positive on all but five examinations, *i.e.*, was negative on two consecutive examinations at one time and on three consecutive examinations later on. The sixth bird was positive on the first 21 examinations and negative on the later ones. The seventh bird was positive on the first 30 examinations and negative on the later ones. Two of the seven birds, therefore, became free from infection with *Tr. gallinae* spontaneously.

—C. Horton Smith.

Jaquette, D. S. (1948.) **Copper sulfate as a treatment for subclinical trichomoniasis in pigeons.**—*Amer. J. vet. Res.* **9.** 206–209. **2919**

The elimination of *Trichomonas gallinae* causing subclinical infections in pigeons was critically tested by the administration of various concentrations of copper sulphate solution. Four methods were used to detect the parasites. The results were somewhat variable, but effective concentrations were (a) 100 mg. of $CuSo_4$ per 100 ml. of water in non-breeding pigeons, (b) 35 mg. of $CuSo_4$ per 100 ml. of water in breeding pigeons: water consumption in the latter group was appreciably increased since they were rearing young. Stronger concentrations than the above were said to be toxic.

J. states that pigeons freed from infection remain susceptible; he discusses control of the disease in the flock.—Fergus S. McCullough.

Jacob, E. (1947.) Kokzidien und Balantidien aus dem Kot vom Rind. **[Coccidia and balantidia from the faeces of cattle.]**—*Dtsch. tierärztl. Wschr.* **54.** 164–166. **2920**

Little is known concerning the occurrence of the various species of coccidia in German cattle. As almost all the species, *e.g.*, *Eimeria ellipsoidalis*, *E. zurnii*, *E. smithi* [*E. bovis*], *E. bukidnonensis*, and *E. auburnensis* are cosmopolitan it is assumed that they occur in Germany as well. The paper is written with a view to stimulating investigation into the species, location and incidence of coccidia in cattle. The parasitic ciliates are also dealt with from this point of view. [There are some omissions from the list of references which would assist the author to a fuller knowledge of the distribution of the parasites within the host.]

—C. Horton Smith.

Grumbles, L. C., Delaplane, J. P., & Higgins, T. C. (1948.) **Prophylactic and therapeutic use of sulfaquinoxaline against coccidia of chickens (*Eimeria tenella*) and *Eimeria necatrix* under field conditions.**—*Poult. Sci.* **27.** 411–419. **2921**

The prophylactic use of sulphaquinoxaline was studied on a commercial poultry farm, where 33,126 broilers were given 0·05% of the drug in the food.

When the drug was fed two days out of each five the coccidiosis mortality fell to 1·73%; the mortality in the 3,085 control birds was 17·43%. No toxic effects were observed.—G. M. U.

Boney, W. A., Jr. (1948.) **The efficacy of methyl bromide as a fumigant for the prevention of cecal coccidiosis in chickens.**—*Amer. J. vet. Res.* **9.** 210–214. **2922**

Methyl bromide was tested as a fumigant against sporulated oocysts of *Eimeria tenella* under natural conditions, using soil and cane-pulp as litter and was found to be effective when applied at the rate of 1 lb. per 1,000 sq. ft. Methyl bromide prevented infection with oocysts from brooder-houses in which cane-pulp was used as litter on a wooden floor when applied at the rate of 2 lb. per 1,000 cu. ft.—C. Horton Smith.

Farr, M. M. (1949.) **Sulfaguanidine therapy in experimental intestinal coccidiosis (*Eimeria acervulina*) of chickens.**—*J. Parasit.* **35.** 208–214. **2923**

The benefit which birds infected with *E. acervulina* derived from treatment with sulphaguanidine bears a relation to the time which elapses between inoculation and treatment. When treatment with 0·5% mash was initiated at the time of inoculation and continued for four days, a temporary prevention of loss of weight and delay in oocyst discharge were effected. A four-day treatment initiated 1–2 days after inoculation delayed discharge of oocysts, reduced oocyst production and prevented loss in weight. Initiation of treatment on the third day after inoculation reduced oocyst production and prevented loss in weight. None of the birds on the four-day treatment made as good weight gain as the uninoculated controls, but those placed on treatment on the fourth and fifth days after inoculation made better weight gains than the inoculated controls and discharged fewer oocysts, but had the same symptoms as the inoculated controls. In the groups treated late in the infection, the greater weight gains of the treated birds appeared to be due to their more rapid recovery. When the birds were held for one month after initial inoculation, the inoculated controls had not reached the weight of the treated birds and these, in turn, had not attained the weight of the uninoculated controls. P.M. examination of the inoculated birds after 5–7 days of treatment revealed few macroscopic lesions, even in those groups placed on treatment as late as four days after inoculation. It is concluded that the drug must have had some

effect on every stage of the cycle of the parasite. In birds re-inoculated 18 days after cessation of treatment there was a marked resistance to re-infection.—C. Horton Smith.

See also abst. **2961** (tsetse fly).

DISEASES CAUSED BY VIRUSES AND RICKETTSIA

Lucas, A. (1948.) L'augmentation du pouvoir pathogène du virus aphteux. **[Increase of virulence of foot and mouth disease virus.]**—*Bull. Off. internat. Epiz.* **29.** 138–142. **2924**

L. concludes from experimental and field observations that strains of F. & M. disease virus may have their virulence greatly enhanced by passage through pigs. Pigs are therefore looked upon as being possible originators of severe field outbreaks of the disease and a tightening up of sanitary measures against pigs is advocated. The consequent importance of immunizing pigs is pointed out and suggestions are put forward of possible ways in which the present-day vaccines might be improved so that an effective immunity in pigs might be produced.—H. H. Skinner.

Schmidt, S., & Holm, P. (1949.) Vaccination de bovins contre la fièvre aphteuse avec des vaccins de compositions différentes utilisés à des doses diverses. **[Vaccines for foot and mouth disease.]**—*Rev. Immunol. Thérap. antimicro.* **13.** 72–87. **2925**

F. & M. disease vaccination in Denmark has consisted of giving 2 × 15 ml. doses with a 2–3 weeks' interval using an aluminium hydroxide bivalent vaccine (types Vallée O and A) containing 0·4% infective material of each type. The authors state that when stocks of this vaccine are exhausted, the recommendation of the 1947 Berne meeting of l'Office International des Epizooties will be followed and one 30 ml. dose will be used. The content of infective material will be raised to 0·8%. Experiments are briefly described dealing with dosage, vaccination of calves, variation in the amount of aluminium hydroxide in the vaccine, the effect of revaccination and the stability of the vaccine.—W. M. Henderson.

de Freitas Biglieri, J., Escuder, D., Carballo Pou, J. F., Magallanes, N., Marini, H. G., Vega, R., & Bagnasco, A. (1948.) Contribucion al estudio de la hematologia bovina. Determinación de los valores sanguinos normales y variaciones comprobadas en la fórmula leucocitaria de bovinos inoculados con virus aftoso. **[Bovine haematology. Determination of normal blood values. Variations of the leucocyte count of cattle inoculated with the virus of foot and mouth disease.]**—*Bol. mens. Direcc. Ganad., Montevideo.* **30.** 85–139. **2926**

In most cases using Hereford, Shorthorn or Friesian cross-bred steers, 10–20 months old, the authors obtained data on the differential leucocyte count of normal cattle and of cattle affected with or convalescent from F. & M. disease. Protocols are included giving individual counts of 100 normal cattle; 20 cattle 15 days convalescent to F. & M. disease; 20 cattle before, 5 hours and 24 hours after inoculation with F. & M. disease virus; various smaller groups of cattle before and at frequent intervals after inoculation for the first 24 hours. The effect of trauma, the injection of pilocarpine, chloroform and crystal violet was also examined in a few cases. In general, the authors found that a monocytosis was present in the convalescent cattle and that soon after inoculation with virus an increase in neutrophiles occurred with a corresponding decrease in lymphocytes. This neutrophilia remained during the development of primary and secondary lesions with considerable fluctuations that were considered characteristic of the infection. [These data are not summarized by giving the means and standard deviations.]—W. M. Henderson.

Dixon, C. W. (1948.) **Smallpox in Tripolitania, 1946: an epidemiological and clinical study of 500 cases, including trials of penicillin treatment.**—*J. Hyg., Camb.* **46.** 351–377. [Author's summary slightly amended.] **2927**

Evidence is presented to show that the period of maximum infectivity is the stage of the pre-ruptive fever. The mildest cases are infectious, but only for a short time.

The virus contained in dried scabs is not considered to be an important source of infection; it may be modified in some way by passage through the skin.

The complex problem of immunity in smallpox is discussed, and it is suggested that three factors operate, an anti-invasion factor, an anti-dissemination factor and a local skin immunity mechanism. A photograph is given of a model made to show the interaction of these three factors in producing the immunity levels which determine the type of disease. It also accounts for the immunity reactions in vaccinia and in smallpox in the vaccinated subject, both when vaccinated successfully during the incubation period of smallpox and when vaccinated successfully some time prior to contact.

Francis, T., Jr., Quilligan, J. J., Jr., & Minuse, E. (1949.) **Resemblance of a strain of swine influenza virus to human A-prime strains.**—

Proc. Soc. exp. Biol., N.Y. **71.** 216–220. [Authors' conclusions copied *verbatim.*] **2928**

A strain of swine influenza virus (Oti), isolated in 1939, has been reinvestigated by serological means and found antigenically to resemble some members of the human A-prime influenza virus group.

Significant increases in the levels of antibody against this swine strain of influenza virus were detected in the convalescent blood specimens of children who had had experience during the A-prime influenza epidemic of early 1947. High titers of antibody were also found against the current A-prime strains.

Adults involved in the same epidemic also showed significant antibody increases against the same swine strain and the current A-prime and Type A strains.

Results of cross hemagglutination inhibition tests with specific ferret anti-sera supported the observations made from the serological tests with human sera.

The relationship of this swine strain to members of the A-prime group has been discussed.

McLean, I. W., Jr., Beard, D., & Beard, J. W. (1947.) **Studies on the immunization of swine against infection with the swine influenza virus. I. Resistance following subcutaneous administration of formolized purified influenza virus.**—*J. Immunol.* **56.** 109–138. **2929**

The virus used in the preparation of the vaccine and in subsequent tests for resistance was an egg-adapted strain. [See McLean *et al. V. B.* **16.** 142.]

In unvaccinated pigs the virus produced a morbidity rate of 98·1%, whereas in vaccinated pigs the morbidity rate was 59%. No significant difference in morbidity was seen in pigs vaccinated one, two or three times with 0·5 mg. virus. The antibody titres of vaccinated pigs were greatly enhanced by exposure to active virus whether the pigs had symptoms or not. The degree of immunity conferred by the vaccine was much less than that induced by exposure to active virus.

The authors discuss the possible bearing of these results on the control of influenza in human beings by vaccination.—D. Luke.

Sugg, J. Y. (1949.) **An influenza virus pneumonia of mice that is nontransferable by serial passage.**—*J. Bact.* **57.** 399–403. [Author's summary copied *verbatim.*] **2930**

Mice inoculated intranasally with allantoic fluids infected with the egg-adapted Cam strain of influenza A prime virus died on the third or fourth day with complete pulmonary consolidation, but suspensions of lungs obtained from those animals did not produce pulmonary lesions when introduced into the lungs of normal mice. The data indicate that the virus particles were the lethal agents, but that only a small percentage of those particles multiplied in the lung tissue.

McClelland, L., & van Rooyen, C. E. (1949). **Studies on the effect of some aromatic amidines and other chemical compounds on the growth of influenza virus in the embryonated egg.**—*Canad. J. Res.* Sect. E. **27.** 177–185. [Authors' abst. copied *verbatim.*] **2931**

The effect of chemicals and biological substances on the growth of influenza virus in the embryonated egg is of interest as a fundamental study and as a means of screening substances for their possible chemotherapeutic activities. This work was done to investigate the activity of some heretofore unreported substances. Most chemicals proved to have no effect on the growth of influenza virus in the developing egg, but one group, the aromatic amidines, and hexamidine in particular, was found to possess some inhibitory action. It was an *in vivo* rather than an *in vitro* effect; it was dependent on the route of inoculation and the amount of drug administered; and the activity was exhibited when the introduction of the drug was delayed for as long as 16 hr. after inoculation of the eggs with influenza virus. Preliminary tests have failed to demonstrate any protection of mice infected with influenza and treated with hexamidine.

Lanni, F., Sharp, D. G., Eckert, E. A., Dillon, E. S., Beard, D., & Beard, J. W. (1949.) **The egg white inhibitor of influenza virus hemagglutination. I. Preparation and properties of semipurified inhibitor.**—*J. biol. Chem.* **179.** 1275–1287. [Authors' summary copied *verbatim.*] **2932**

By means of chemical or ultracentrifugal fractionation, the egg white inhibitor of swine influenza virus hemagglutination has been obtained in solutions up to 60 times as active as crude egg white. The inhibitory activity was associated with a highly viscous, heat stable, non-dialyzable component with the properties of a protein-carbohydrate complex. Analysis showed N 12·5, S 2·4, and carbohydrate, calculated as glucose, 10·3 per cent; no phosphorus was found. An ultraviolet absorption maximum occurred at 2780 A. Electrophoretic analysis showed two components, one corresponding to the *F* component and the other to a member of the globulin-ovomucoid group.

The active component sedimented to the extent of 70 to 80 per cent in 90 minutes at 67,000 × *g*, and Lamm scale analysis showed a single, slightly diffuse boundary with a sedimentation constant of 31 to 37 S. Electron micrographs

revealed spheroidal particles 10 to 20 mμ in diameter, arranged in clusters of indefinite configuration or in threads. The mean diameter derived from the sedimentation constant on the assumption of spherical particles of hydrated density 1·25 was about 15 mμ. In contrast, classical treatment of the sedimentation and viscosity data together indicated a particle molecular weight of $7{\cdot}6 \times 10^6$ for a rigid prolate ellipsoid with an axial ratio of 1 : 90. No evidence of such particles was seen in the electron micrographs.

MACE, D. L., OTT, R. L., & CORTEZ, F. S. (1949.) **Evidence of the presence of equine encephalomyelitis virus in Philippine animals.**—*Bull. U.S. Army med. Dep.* **9.** 504–507. [Authors' summary copied *verbatim*.] **2933**

A native Philippine monkey that showed a paralysis of the legs was presented for treatment. A virus was isolated and tentatively identified as the Eastern strain of equine encephalomyelitis. This identification was confirmed by the Virus and Rickettsial Disease Department, Army Medical Department Research and Graduate School, Washington, D.C. Twenty-six of 86 known unvaccinated horses showed a neutralization index of 50 or more. The presence of neutralizing substances in the blood of Philippine horses strengthens the virus isolation evidence that Eastern equine encephalomyelitis is present in the Philippines.

PAGOT, J., GOUGIS, R., & HULIN, P. (1948.) Essais d'immunisation des zébus contre la peste bovine par un virus atténué par passage sur chèvre. **[Attempt at immunization of zebu cattle against rinderpest with a goat-passaged virus.]**—*Rev. Élev. Méd. vét. Pays trop.* **2.** 91–101 ; 103–109. **2934**

Preliminary trials at the laboratory and then the results of use in the field of a strain of goat virus obtained from Nigeria are described. The area in which the work was done has a difficult climate and fodder for the cattle was often inadequate. The vaccine was used both as desiccated spleen and as fresh blood and the relative advantages and disadvantages of these are discussed. The authors conclude that the use of serum along with virus is of no value, that a satisfactory immunity lasting at least one year is obtained, that a certain percentage of cattle fail to react for some reason which was not determined, and that spread of infection from vaccinated to healthy goats does not occur under field conditions. More than 30,000 cattle were inoculated with results which were satisfactory to the nomad owners who are generally averse to new methods.—M. C.

ZAVAGLI, V. (1947.) L'agalassia contagiosa delle pecore e delle capre. II. Modificazione nella virulenza del virus agalattico e sua vitalitá alle diverse temperature di conservazione. **[Contagious agalactia of sheep and goats. II. Modification of the virulence of the agent of agalactia and its viability at various preserving temperatures.]**—*Zooprofilassi.* **2.** No. 10. 1–10. [French summary.] **2935**

Z. states that rapid serial passage in sheep decreases the incubation period and increases the virulence of the infectious agent of agalactia. Dilution of the agent results in increase of the incubation period and decrease in virulence. At 15°C. infected milk retains its pathogenicity for three months, at 8°C. for not more than four months and at 20°C. the virulence of the infectious organism can be preserved for 8–9 months. Whether the infectious agent is preserved in tissue or in milk its viability is not influenced.—E. G.

I. BURGESS, D. (1949.) **Hard pad disease. [Correspondence.]**—*Vet. Rec.* **61.** 83. **2936**

II. HALPIN, F. B. (1949.) **So-called " hard pad disease." [Correspondence.]**—*Ibid.* 171–172. **2937**

III. GREER, F. G. (1949.) **Immunological relationship of hard pad and distemper viruses.** —*Ibid.* 163. **2938**

IV. FREAK, M. F. (1949.) **A " brown mouth " syndrome in dogs.**—*Ibid.* 190. **2939**

V. BATEMAN, J. K. (1949.) **Recent experiences in post-inoculation behaviour in the greyhound, following the use of field distemper method T, anti-vaccination.**—*Ibid.* 278–283. **2940**

VI. WELSH, W. C. (1949.) **This so-called " hard pad " disease. [Correspondence.]**—*Ibid.* 315–316. **2941**

VII. GREER, F. G. (1949.) **Hard pad disease. [Correspondence.]**—*Ibid.* 331. **2942**

VIII. PUGH, L. P. (1949.) **So-called " hard pad " disease.**—*Ibid.* 363–364. **2943**

I. This is a note written to the effect that the disease has now been recognized in Southern Rhodesia. No data are given.

II. This is a brief note consequent to the article by Ormrod mentioning a few points of his experience as a practitioner, the most important of which is that the disease has been seen in puppies between three and five months old, but never in dogs over nine months.

III. An epidemic occurred in a kennel of 25 dogs in some of which, from blood samples and tissues, hard pad disease virus was identified by ferret inoculation. Twenty-one of the dogs had been immunized against distemper, while four had recovered from a natural attack. Of the 21, 11 had reacted to the vaccine virus. The morbidity rate in this group was 27 % but 100 % in the group which had not reacted. The course of the illness was four days in the reactors. There may be an

inverse ratio between the occurrence and severity of hard pad disease and the degree of reaction following administration of the proprietary vaccine virus used.

IV. F. describes briefly an outbreak of the disease in dogs, but sporadic cases had been seen previously. In acute cases the first symptoms noted were refusal of food and malaise; later there was diarrhoea proceeding to dysentery, fever, abdominal pain, gingivitis proceeding to ulcers, marked dehydration, and collapse and death within 2–10 days. P.M. examination revealed enlarged and red lymph nodes, diffuse enteritis and congestion of the liver. Leptospirosis was excluded. Penicillin gave spectacular therapeutic results.

V. B.'s main thesis was a denial of the existence of a specific hard pad virus. In support of this, considerable details were given of an outbreak of illness in greyhounds vaccinated against dog distemper by the vaccine-virus method; the illness was diagnosed by laboratory examination as hard pad disease. B., however, found it was difficult to associate the illness with any cause other than distemper in dogs which had not been effectively immunized as evidenced by the absence of a reaction (temperature curve) at the time the vaccine was used; a dog which does not react after injection of the virus cannot be accepted as being immune. 95% of the greyhounds which became ill were non-reactors.

VI. This is a reply to Bateman's article (see above) stating that hard pad disease had been seen in dogs which had been vaccinated against distemper and had reacted. W. considered that distemper has decreased in incidence; hard pads are not a constant sign of hard pad disease.

VII. G. draws attention to discrepancies between Bateman's findings and statements and those in the original communication by MacIntyre *et al.* [*V. B.* **19.** 401]. (1) The incubation period of hard pad disease virus is quite distinctly different from that of distemper virus. (2) Ferrets injected with hard pad disease virus commonly recover. Ferrets injected with distemper virus rarely recover. (3) Dogs (if susceptible) merely have a 10 to 14 day period of febrile indisposition after hard pad disease virus injection. Contrast this with the course taken by a dog injected with distemper virus. (4) A hard pad immune dog is susceptible to distemper virus. A distemper immune dog is susceptible to hard pad virus. (5) Hard pad virus is not neutralized *in vitro* by hyperimmune distemper serum.

VIII. P. summed up very succinctly the different schools of thought on the nature of hard pad disease. (1) Those who believe H.P. (hard pad) to be a completely new disease. (2) Those who believe H.P. to be due to L. & D. (Laidlaw & Dunkin) virus in a neurotropic form. (3) Those who look upon H.P. virus as an accidental or aberrant form of the L. & D. virus. (4) Those who think that H.P. virus has been with us for a long time and has frequently been mixed up with or mistaken for L. & D. virus. (5) Those who consider the condition to be due to β haemolytic streptococcal infection complicated by bowel parasites. A summary was given of the symptoms, prognosis and treatment of this disease which seems to be quite well known now to all practitioners, at least in England. Pugh in the discussion emphasized his own views that hard pad virus infection has been present in England for many years but has frequently been mixed up with, or mistaken for true distemper infection. The discussion largely brought out the individual experiences of various practitioners, some of whom felt that the name was a misnomer. Montgomerie pointed out again that the disease was due to a virus which was not the same as Laidlaw & Dunkin distemper virus and that dogs inoculated against the latter had some immunity to hard pad disease. Trevan indicated an important new observation that ferrets can develop natural infections of hard pad disease. It would seem that the use of sulphonamide therapy was definitely contra-indicated as it interfered with the bacterial flora. [There are many more virus diseases of dogs in existence than ever were imagined some years ago and all of them, no doubt, have been mistaken in the past for distemper on clinical grounds. The limitations of what can be done by clinical methods and by reliance upon gross anatomical findings reduces the value of many observations by clinicians. In this complex field of canine pathology, as indeed in the case of many other animal diseases, clear identification of the nature of the disease by meticulous pathological studies should be the first step and that has not yet been done or in fact generally appreciated. Scientific investigations would not proceed very far, for example, if the totality of pneumonia in animals was investigated in the same way. Without the help of histological, bacteriological, clinico-pathological techniques, etc., hopeless confusion would exist in trying to differentiate pneumonias caused by a multiplicity of varieties of bacteria and viruses.]—J. R. M. Innes.

Cabasso, V., & Cox, H. R. (1949.) **Propagation of canine distemper virus on the chorio-allantoic membrane of embryonated hen eggs.** —*Proc. Soc. exp. Biol., N.Y.* **71.** 246–250. [Authors' summary copied *verbatim*.] **2944**

Studies are reported in which the *Lederle* stock strain of canine distemper virus was adapted and maintained through 74 serial passages on the

chorio-allantoic membranes of developing chick embryos. The chick embryo adapted strain retained its capacity to produce lethal infection in ferrets through the 24th egg passage level but apparently lost its ability to do so between the 24th and 28th egg passages. Ferrets inoculated with chick embryo adapted virus of passage levels higher than the 28th transfer failed to show any signs of disease, but were found immune on rechallenge with fully virulent ferret spleen virus. Cross neutralization tests carried out in chick embryos and in ferrets indicate that the chick embryo adapted strain and the parent strain of ferret spleen virus are immunologically related.

SASSENHOF, I. (1947.) Erfahrungen bei der Bekampfung der Geflügelpest. [**Experiences gained from fowl-plague [Newcastle disease ?] control.**]—*Berl. Münch. tierärztl. Wschr.* No. 7. pp. 73–78. **2945**

The difficulty of correct diagnosis of fowl plague is emphasized. S. regards haemorrhages and haemorrhagic ulcers of the mucosa of the proventriculus, the serosa of the sternum, the intestine and the vitelline follicles as distinctive lesions. Particularly outstanding signs are haemorrhagic and necrotic lesions in the intestinal canal, namely in the vicinity of the solitary glands and Peyer's patches in the small intestine. The changes in the walls of the vessels are in S.'s opinion not to be regarded as typical, nor is non-purulent encephalitis. Both these lesions are common also in other poultry diseases.

Traub's adsorbate vaccine yielded satisfactory results as a preventive measure. Immunity in old birds was achieved after 4–5 weeks with 1–2 inoculations, in young birds after about six weeks. Young birds should not be vaccinated earlier than the age of four months. Immunity is supposed to last for about 6–7 months.

There is no foundation for the common belief that the inoculation interferes with egg production.—E. G.

INGALLS, W. L., & MAHONEY, A. (1949.) **Isolation of the virus of Newcastle disease from human beings.**—*Amer. J. publ. Hlth.* **39.** 737–740. [Authors' summary copied *verbatim.*] **2946**

Two natural occurring cases of conjunctivitis thought to be due to the virus of Newcastle are reported. One case occurred in a broiler plant operator on whose premises Newcastle disease was in progress; and the second case was a veterinary student who, in the course of his clinical work, autopsied 3 chickens affected with acute cases of Newcastle disease. In the broiler plant operator, the virus identification was confirmed by hemagglutination, hemagglutination inhibition, serum neutralization techniques, and antibody response in chickens.

In the case of the student the virus identification was confirmed by hemagglutination, hemagglutination inhibition, and serum neutralization.

In addition to the above, virus sent to the Pathological Division, U.S. Bureau of Animal Industry was identified as Newcastle virus.

This is believed to be the first reported case of the isolation of the virus of Newcastle disease from man in the United States.

I. MORGAN, I. M. (1949.) **Differentiation of types of poliomyelitis viruses. II. By reciprocal vaccination-immunity experiments.**—*Amer. J. Hyg.* **49.** 225–233. [Author's summary slightly modified.] **2947**

II. BODIAN, D., MORGAN, I. M., & HOWE, H. A. (1949.) **Differentiation of types of poliomyelitis viruses. III. The grouping of fourteen strains into three basic immunological types.**—*Ibid.* 234–245. [Authors' summary copied *verbatim.*] **2948**

I. This study confirms the results of earlier work that, by sufficient intramuscular vaccination with Lansing virus, monkeys became immune to intracerebral injection of the same virus. The fact that such vaccinated monkeys are immune to some but not other strains of poliomyelitis virus forms the basis for a method of differentiation of immunological types of the virus. The method is demonstrated in this report by the results of reciprocal immunization with 4 strains of poliomyelitis virus.

II. Two poliomyelitis strains of distinctly different antigenic properties were used as prototype viruses for the grouping of 12 other strains (Lansing and Brunhilde). Groups of animals vaccinated with the prototype strains were tested for intracerebral immunity with the " unknown " strains. One strain (Leon) was shown to be unrelated to either of the two prototype strains. Three were shown to be related to Lansing and not to Brunhilde. Eight were shown to be related to the Brunhilde and not to the Lansing. It therefore appears that there are at least 3 basic immunological types of poliomyelitis viruses, characterized by their inability as antigens to induce protection against viruses of another type.

GARD, S. (1945.) **Distribution of poliomyelitis virus in the intestines of normal mice.**—*Acta med. scand.* **120.** 40–52. [In English. Author's summary slightly amended.] **2949**

The concentration of mouse poliomyelitis virus in the ingesta and the intestinal wall of healthy mice was determined by titration in mice.

The viral activity of the intestinal contents exceeded that of the wall by about 10 times. When the special conditions of the experiments were considered it could be concluded that at most a

few per cent of the total virus content might be present in the interior of intestinal cells.

This indicates that the multiplication of virus might occur in the ingesta, presumably in a micro-organism serving as a host.

The virus, when present at all, was almost constantly found also in the uppermost part of the small intestines.

BOVARNICK, M. R., & SNYDER, J. C. (1949.) **Respiration of typhus rickettsiae.**—*J. exp. Med.* **89.** 561–565. [Authors' summary copied *verbatim.*] **2950**

Partially purified suspensions of typhus rickettsiae have been shown to exhibit metabolic activity as evidenced by consumption of oxygen and production of carbon dioxide in the presence of glutamate. Similar activity at a much lower rate occurs in the presence of pyruvate. The rate of oxygen uptake was directly proportional to the concentration of viable rickettsiae, as estimated by their toxicity for mice. Normal yolk sac suspensions prepared in the same manner showed only a very slight oxygen uptake under the same conditions. Glucose was not metabolized by the rickettsial suspensions.

SNYDER, J. C., MURRAY, E. S., YEOMANS, A., ZARAFONETIS, C. J. D., & WHEELER, C. M. (1949.) **The effect of typhus vaccine on the numbers of rickettsiae in body lice of typhus patients.** — *Amer. J. Hyg.* **49.** 340 – 345. [Authors' summary slightly amended.] **2951**

Laboratory-reared human body lice were fed continuously for 10 days on 10 typhus patients who had not received immunization prior to the onset of their illness, and on 6 patients who had received 3 or more doses of Cox-type typhus vaccine. The numbers of viable *Rickettsia prowazeki* in the lice at the end of a 10-day feeding period were compared by animal inoculations. The mean value of *R. prowazeki* for the unvaccinated patients was 2,300 per ml as compared with a mean value of 10 per ml for the vaccinated patients.

IMMUNITY

I. MORE, R. H., WAUGH, D., & KOBERNICK, S. D. (1949.) **Cardiac lesions produced in rabbits by massive injections of bovine serum gamma globulin.**—*J. exp. Med.* **89.** 555–560. [Authors' conclusions copied *verbatim.*] **2952**

II. MORE, R. H., & WAUGH, D. (1949.) **Diffuse glomerulonephritis produced in rabbits by massive injections of bovine serum gamma globulin.**—*Ibid.* 541–554. [Authors' summary and conclusions copied *verbatim.*] **2953**

I. Granulomatous lesions of the valves and valve rings have been produced in 52 per cent of rabbits treated by massive intravenous administrations of bovine gamma globulin in such a way as to establish a state of anaphylactic hypersensitivity in the animals. The incidence of the lesions is greater than has heretofore been reported as produced by the use of any type of foreign protein injection in rabbits.

The use of a purified protein antigen has resulted in the production of several different types of lesions ; namely, a granulomatous inflammation of heart valves and valve rings, a glomerulonephritis, and an arteritis.

The lesions of the heart cannot be regarded as being identical with the lesions of human rheumatic fever, but they are considered to be sufficiently similar to warrant a continuation of this approach to the study of the etiology and pathogenesis of rheumatic fever in man.

II. A high incidence of acute diffuse glomerulitis was produced in unilaterally nephrectomized rabbits by injection with two successive doses of purified bovine serum gamma globulin (fraction II). This experimental nephritis is morphologically analogous to human acute and subacute diffuse glomerulonephritis. The technique described is advanced as a valuable experimental method in the study of the pathogenesis of glomerulonephritis.

Qualitative immunological investigations produced no evidence that the pathogenesis of experimental globulin nephritis is mediated by kidney auto-antibodies. The rôle of hypersensitivity in the pathogenesis of nephritis is discussed.

During the 1st week of the development of experimental globulin nephritis there is a significant increase in blood coagulability, as shown by a lowering of the mean coagulation time in globulin-treated animals during this period. This observation has not been reported previously. The possible relation of this increased blood coagulability to the formation of coagula in the glomerular capillaries is discussed.

The injection of a single purified antigen (bovine serum gamma globulin) produced three distinct types of lesion, diffuse glomerulitis, focal granulomata of the heart valves and valve rings, and coronary arteritis.

MCKERNS, K. W., & DENSTEDT, O. F. (1949.) **Agglutination of erythrocytes containing sulphaemoglobin—Further evidence of specific aggregation.**—*Canad. J. Res.* Sect. E. **27.** 164–170. [Authors' abst. copied *verbatim.*] **2954**

By sulphuration of red blood cells with hydrogen sulphide, up o 75 % of the haemoglobin

can be converted to sulphaemoglobin without seriously impairing the osmotic stability or the agglutinability of the cells with various antisera with exception of anti-Rh. Unlike the A, B, M and N agglutinogens, the Rh factor is labile to sulphuration and numerous other treatments. Sulphurated cells, by their size and color, can be distinguished from normal cells under the microscope. This feature has been used to confirm Marrack's hypothesis that the aggregation phase of the agglutination reaction is specific.

BIRKHAUG, K., & BERLE, E. (1945.) **Allergy and immunity (iathergy) in experimental tuberculosis. XIII. Intradermal spread of vital dye in anergic, allergic and iathergic tuberculous guinea pigs.**—*Acta med. scand.* **121.** 115–131. [In English. Authors' summary copied *verbatim.*] **2955**

The skin of allergic tuberculous guinea pigs displays a restricting influence on the spread of a non-specific and isotonic vital dye, pontamine sky blue and the intralymphatic drainage of the dye is significantly slower than in the normal or moribund anergic tuberculous guinea pig.

The skin of non-immunized or immunized tuberculous guinea pigs, which have been desensitized during immunization and infection, displays no restriction to the spread of the dye and in this respect simulates the skin of normal animals.

A comparative study of the extent of the dermal tuberculin reaction and the diffusion of a vital dye in hypersensitive and desensitized iathergic immune tuberculous guinea pigs shows that the intensity of the tuberculin reaction is inversely proportionate to the spread of the dye.

See also absts. **2855** (complement fixation in TB.); **2862** and **2871** (TB.); **2880** and **2887-2888** (brucellosis); **2890** (cl. oedematiens); **2891** (toxin); **2917** (trichomoniasis); **2921-2922** (coccidiosis); **2925** (F. & M. disease); **2929** (swine influenza); **2932** (haemagglutination); **2934** (rinderpest); **2938** and **2940** (hard pad disease); **2951** (rickettsia); **3044** (Schwartzman phenomenon); **3083** (BCG textbook).

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

HEPDING, L. (1948.) Über die Eignung des Hexachlorzyklohexans als Ektoparasitenmittel. [**Hexachlorcyclohexane as a parasiticide.**]—*Tierärztl. Umsch.* **3.** 320–323. **2956**

The lethal action of γ-benzene hexachloride on lice, fleas, ticks, sheep keds, bed bugs and red fowl mites was verified *in vitro*. The acute toxicity of γ-benzene hexachloride for rodents *per os* is about the same as that of D.D.T.—about 0·5 g. per kg. Against lice, however, γ-benzene hexachloride is 100 times as toxic; *i.e.* the effective concentration of the former is only a small fraction of that of the latter. It was found that mice can tolerate without harm *per os* the largest amount of 5% γ-benzene hexachloride as "jacutin" powder that can possibly be applied externally, so there is no risk from an animal licking off this parasiticide from its body surface. Other data on toxicity, when D.D.T. was given to experimental animals, are also given and reference is made to the successful use of benzene hexachloride in mange of various domestic animals.

—J. E.

UNSWORTH, K. (1948.) **Observations on the occurrence of larvae of *Oestrus ovis* in the nasal cavities and frontal sinuses of goats in Nigeria.**—*Ann. trop. Med. Parasit.* **42.** 249–250. **2957**

During the month of May the nasal chambers and frontal sinuses of 220 goats were examined for the presence of larvae of *O. ovis*. Parasites were found in 97 of the goats and, since the majority of the larvae were young forms, it is suggested that the fly was most active during the hot dry period immediately preceding the examination. The precise economic importance of *O. ovis* in Nigeria is not known.—S. BRIAN KENDALL.

DIKMANS, G. (1948.) *Hypoderma bovis* **larvae from the esophagus of sheep.**—*Proc. helminth. Soc., Wash.* **15.** 41–42. **2958**

Fly larvae isolated from the oesophagus of an aged ewe which had been slaughtered in Colorado were identified as *H. bovis*. There is no previous record of the occurrence of this parasite under natural conditions in sheep in North America.

—S. BRIAN KENDALL.

BEACHER, J. H., & PARKER, W. L. (1948.) **Residual toxicity.**—*Soap & Sanit. Chem.* **24.** No. 6. 139, 141, 143; 163. **2959**

In a series of toxicity trials in which water emulsion of "toxaphene" and D.D.T. were sprayed upon various surfaces to give a theoretical deposit of 100 mg. of toxicant per square foot and compared for residual effectiveness against the house fly over a period of 225 days, D.D.T. proved superior to "toxaphene" in speed of knockdown and in six-hour mortality for all surfaces tested.—W. MOORE.

BETTINI, S., & BARACHINI, B. (1948.) Primi resultati della lotta con l'octa-klor ed il gammaesano contro le mosche domestiche resistenti al DDT. [**The use of octa-chlor and gammexane to kill houseflies which are resistant to D.D.T.**] —*Riv. Parassit.* **9.** 85–91. [Abst. in *Bull. Hyg., Lond.* **23.** 799. (1948), copied *verbatim.* Signed: P. A. BUXTON.] **2960**

The authors worked in an area in which the house-flies (*M. domestica*) appear to have become resistant to DDT: that is to say, these insects continued to be abundant after the walls had been

treated with DDT in paraffin at a dosage which had previously been found adequate. When walls were sprayed with Octa-chlor in paraffin, at a dosage of 2·0 to 2·5 gm. per square metre, it seemed that a very high kill of flies resulted and that the insecticidal effect persisted for six months. [Octa-chlor is identical with Chlordane and Velsicol 1068.] In using the same technique there was some evidence that Gammexane at 2·0 gm. per square metre was effective for more than one month. [These conclusions appear to be based entirely on observations in the field, without any confirmation by work carried out under more precise conditions.]

There was no evidence that the Octa-chlor was toxic to the sprayers or to the people living in the houses. The smell of Gammexane was found to be extremely objectionable even to the point of causing nausea and vomiting.

BUXTON, P. A. (1948.) **The seventeenth Stephen Paget Memorial Lecture. " Tsetse flies and the development of Africa."**—*Fight ag. Dis.* **36.** 10–17. **2961**

Deaths from human trypanosomiasis are not now very numerous although large numbers of cases occur and require treatment in West Africa.

Cattle trypanosomiasis is a much more serious problem, not so much because of the loss of cattle, but because the presence of the disease in many areas precludes the keeping of cattle and so affects the nutrition of the human population and the cultivation of the soil. The total area of Africa on which the tsetse fly occurs is 4,500,000 square miles, about twice the area of the U.S.A.

In dealing with the problem, studies of the transmitting fly are of great importance, as B. considers the fly is the key to the problem. Methods for attacking the fly comprise clearing of vegetation to bring about conditions unfavourable to the fly, game destruction to deprive the fly of its food supply, and the use of insecticides. B. is of opinion that insecticides cannot deal with large fly belts.—M. C.

GORDON, R. M., & CREWE, W. (1948.) **The mechanisms by which mosquitoes and tsetse flies obtain their blood-meal, the histology of the lesions produced, and the subsequent reactions of the mammalian host; together with some observations on the feeding of *Chrysops* and *Cimex*.**—*Ann. trop. Med. Parasit.* **42.** 334–356. **2962**

Previous observations on the flexibility of the proboscis of mosquitoes are confirmed, and a similar mechanism is shown to obtain for *Glossina* and *Cimex*. The flexible proboscis is used to lacerate the host tissues over a wide area, producing a haemorrhage on which the insect can feed. This " pool feeding " from extravasated blood is generally employed by *Glossina*, *Chrysops* and *Cimex*, in contrast to the insertion of the tip of the proboscis into the lumen of a capillary, which is sometimes adopted by mosquitoes.

The effects of mosquito bites are of two types: an immediate reaction, which is due to sensitization of the host by irregular exposure; and a delayed reaction, caused by the injection of a slow-acting toxic substance in the saliva. Desensitization to both types of reaction is effected by continuous, regular exposure to bites, and it is suggested that this, rather than a racial characteristic, accounts for the reputed " immunity " to bites shown by natives of the tropics.

The effects of uncomplicated bites of *Glossina* are due simply to mechanical trauma. Visible reactions occur only in sensitized hosts, and consist of a weal surrounded by an area of erythema. In highly sensitized subjects there may be severe swelling of adjacent areas. The causative substance is contained in the salivary fluid, and is injected continuously during biting.

The significance of these findings in relation to the transmission of parasites is discussed briefly. Published data in this field are reviewed (43 refs.), and the various methods of feeding of the above species, with the resulting lesions, are illustrated by plates and line drawings.—E. P. P.

ENIGK, K. (1948.) Die Bekämpfung der Schaflausfliege. [**Control of the sheep ked.**]—*Tierärztl. Umsch.* **3.** 285–287. **2963**

A general note on well known preparations. E. found that D.D.T. and hexachlorcyclohexane (benzene hexachloride) are the most effective agents against *Melophagus ovinus* and give protection lasting six weeks and longer against adults. Pupae are not affected. A liquid suspension is more effective than a dusting powder; during the cold season, however, powder should be applied. Sheep can be kept free from keds if treatment is repeated every 3–4 months.—E. G.

DIAS, J. A. T. S. (1947.) Mais dois ixodideos do género Amblyoma para a fauna de Moçambique. [*Amblyomma theileri* **and** *A. tholloni* **in Mozambique.**]—*Rev. Med. vet. Lisboa.* **42.** 241–251. **2964**

D. has done much work on ticks and tick control in East Africa. He discusses *Amblyomma variegatum*, *A. hebraeum*, *A. marmoreum*, *A. eburneum*, *A. petersi* and *A. pomposum* from Portuguese East Africa and describes two new ones, *A. theileri* n. sp. and *A. tholloni* Neumann, 1899. He gives a key for the identification of these eight species.—F. A. ESTEVES.

See also absts. **2951** (body lice and rickettsia); **3012** and **3058** (D.D.T.); **3019** (insecticide poisoning).

PARASITES IN RELATION TO DISEASES [HELMINTHS]

ANON. (1948.) **Notes on animal diseases. XXI—Diseases caused by worms—(Part I.)**—*E. Afr. agric. J.* **14.** 18–25. 2965

ANON. (1948.) **Notes on animal diseases. XXI—Diseases caused by worms—(Part II).**—*Ibid.* 105–109. 2966

I & II. These are semi-popular articles for farmers. An introductory section deals with host-parasite relationships and the epidemiology of helminth infections. Although frequent changes of pasture may be practised, the water shortage in East Africa may lead to continual use of the same supply, resulting in gross contamination of the area with infective nematode larvae; further, while the tendency of stock to use the fouled soil as a salt lick exacerbates the danger.

Information is given on the life histories, pathogenicity, and control of the common species of helminths occurring in E. Africa.—E. P. P.

KENDALL, S. B. (1949.) **Bionomics of *Limnaea truncatula* and the parthenitae of *Fasciola hepatica* under drought conditions.**—*J. Helminth.* **23.** 57–68. 2967

This work confirms that *L. truncatula* is an amphibious snail and that its habitat often becomes dry for part of the year.

During drought, laboratory snails have been found to survive over a year in a state of aestivation. Eggs appear to be less resistant than the adults. During drought conditions, *F. hepatica* will survive and develop slowly in the snail, and when the drought ends, both parasite and host will develop rapidly.

These factors are considered to be of importance in the epidemiology of fascioliasis.

[**parthenita**—"unisexual stage of trematodes in intermediate host." *Henderson's Dictionary of Scientific Terms (1949).*]—G. M. URQUHART.

GONZÁLEZ CASTRO, J. (1947.) Fasciolosis hepatica en general y en especial en España. [**Infestation by *Fasciola hepatica*, especially as it occurs in Spain.**]—*Med. colon., Madrid.* **10.** 221–268. 2968

A lengthy semi-popular account of published information about liver-fluke infestation. There are some original photomicrographs and an extensive bibliography. Special attention is paid to the disease in man.—S. BRIAN KENDALL.

VON BONSDORFF, B. (1939.) **Liver extract exposed to the action of intestinal worms does not lose its anti-anemic effect. Diphyllobothrium latum and pernicious anemia I.**—*Acta med. scand.* **100.** 436–458. [In English. Author's summary slightly modified.] 2969

VON BONSDORFF, B. (1939.) **The influence of intestinal worms on the proteolytic activity in vitro of trypsin, papain and pepsin and especially of human gastric juice at neutral reaction. Diphyllobothrium latum and pernicious anemia II.**—*Ibid.* 459–482. [In English. Abst. from author's summary and conclusions.] 2970

VON BONSDORFF, B. (1940.) **The inhibitory effect of Diphyllobothrium latum on the proteolytic activity in vitro of depepsinized human gastric juice. Diphyllobothrium latum and pernicious anemia III.**—*Ibid.* **105.** 502–515. [In English. Author's summary slightly modified.] 2971

VON BONSDORFF, B. (1940.) **On the reticulocyte response and course of remission after removal of the worm in patients with Diphyllobothrium latum and pernicious anemia. Diphyllobothrium latum and pernicious anemia IV.**—*Ibid.* 516–539. [In English. Abst. from author's summary.] 2972

VON BONSDORFF, B. (1940.) **On the proteolytic activity in vitro at neutral reaction of gastric juice from patients with cryptogenetic pernicious anemia and with pernicious anemia due to Diphyllobothrium latum. Diphyllobothrium latum and pernicious anemia V.**—*Ibid.* 540–557. [In English. Author's summary slightly modified.] 2973

VON BONSDORFF, B. (1943.) **On the remission after removal of the worm in pernicious anemia in presence and absence of extrinsic factor in the food. Diphyllobothrium latum and pernicious anemia VI.**—*Ibid.* **116.** 77–95. [In English. Author's summary slightly amended.] 2974

VON BONSDORFF, B. (1947.) **"Castle's test" in pernicious tapeworm anemia. Diphyllobothrium latum and pernicious anemia VII.**—*Acta med. scand.* Suppl. No. 196. 456–477. [In English.] 2975

VON BONSDORFF, B. (1947.) **Does feeding of Diphyllobothrium latum influence the interaction between the intrinsic and the extrinsic factors of Castle? Diphyllobothrium latum and pernicious anemia VIII**—*Acta med. scand.* **129.** 59–76. [In English. Author's summary slightly modified.] 2976

VON BONSDORFF, B. (1947.) **In which part of the intestinal canal is the fish tapeworm found? Diphyllobothrium latum and pernicious anemia IX.**—*Ibid.* 142–155. [In English. Abst. from author's summary.] 2977

I. A liver preparation which was exposed *in vitro* to the effects of fresh *D. latum*, *Taenia saginata* and *Ascaris lumbricoides*, of boiled *D. latum*, of alcohol extract of *D. latum* and of *Bact. coli*, did not lose demonstrably in anti-anemic effect through any of these treatments.

II. Aqueous extracts of fresh and dried *D. latum* and *Taenia saginata* and of fresh *Ascaris lumbricoides* exercise a marked inhibiting influence upon the proteolytic activity of normal human gastric juice (on casein) at a reaction in the vicinity of the neutral point.

The same substances do not inhibit the action of trypsin, papain, and pepsin and of gastric juice at strong acid reaction ; on the contrary, the hydrolysis expressed in increase in nitrogen in the trichloracetic acid filtrates is more marked in the digests containing worm emulsion.

The worm proteins are quickly digested by trypsin, papain, and pepsin, but not by gastric juice at pH 7·4.

The addition of a broth culture of *B. coli* does not noticeably influence the proteolytic effect either of trypsin, or pepsin, or of gastric juice, at neutral reaction.

D. latum has considerable proteolytic effect on casein. Maximum digestion occurs at pH 4 ; with a lower pH the digestion decreases quickly ; with a higher pH more slowly ; a moderate digestion still occurs at a neutral and slightly alkaline reaction. Within the range of this acidity there is an auto-digestion of the worm. The enzymatic activity of *T. saginata* and *A. lumbricoides* is less than that of *D. latum*. The worm enzyme is possibly identical with cathepsin.

III. The gastric protease which is active at a pH range from 5 to 9 and above—and which is considered to be identical with the so-called " intrinsic factor "—is greatly inhibited in its hydrolytic capacity *in vitro* after the addition of even relatively small amounts of a suspension of fresh *D. latum*. The inhibitory effect is well preserved in dried worm, but it gradually becomes weaker after storage for more than 3–4 months. The inhibiting substance is destroyed by heating to 80° C. for 20 minutes. It is not dialyzable and is not soluble in ether, nor yet in 96 per cent ethyl alcohol. It cannot be precipitated with 50 per cent alcohol, but can be precipitated quantitatively in 90 per cent alcohol. The inhibitory effect is equally great, independent of the pH at which the aqueous extracts are prepared (proved for pH 1·7 to 9·0), and it is obviously not conditioned by any product arising during the autolysis of the worm ; in other words, the inhibitory substance is to be found preformed in the worm.

IV. In *D. latum* carriers with pernicious anemia the expulsion of the worm is usually followed by a definite reticulocyte response and blood regeneration. In these cases the anemia can be regarded as caused by the parasite. In certain cases the worm infestation only represents an incidental association with the anemia ; the administration of the anthelmintic is not followed by remission. In some cases of cryptogenetic pernicious anemia it seems that the presence of *D. latum* makes the disease picture worse.

The reticulocyte response in cases of pernicious tapeworm anemia after the worm has been expelled does not reach quite such high values, but instead lasts considerably longer than after injections of a potent liver preparation. In both cases the remission proceeds at the same rate (about 100,000 red blood corpuscles per c. mm. per day).

A change of the megaloblastic proliferation begins within 48 hours of the expulsion of the worm.

V. The proteolytic gastric enzyme active at neutral reaction—like the intrinsic factor—is present in cases of pernicious anemia in *D. latum* carriers where the blood disease is proved to be due to the infestation with the worm, as well as in cases where this connection is more or less uncertain for different reasons. This enzyme also occurs regularly in cryptogenetic pernicious anemia.

VI. In patients with pernicious anemia, who are given a diet consisting of carbohydrates, fat and vegetables and thus presumably poor in Castle's " extrinsic factor," blood remission fails to appear after the expulsion of the worm. After substances, rich in protein and probably containing the " extrinsic factor," have been added to the diet, blood values improve quickly. In this way remission has been caused by meat, milk, Hammarsten's caseine, commercial pepton, brewer's yeast and a concentrated yeast extract, as well as—to a lesser degree—by soy bean protein.

VII. In earlier work [see preceding absts.] the author found that pernicious tapeworm anaemia could arise in patients in whom intrinsic and extrinsic factors were available in sufficient amounts, *i.e.*, in patients with a normal gastric secretion containing free hydrochloric acid and with a pH below 8 and whose diet was sufficient and well balanced. It thus occurred to him that pernicious tape-worm anaemia might be caused by hindrance of interaction between the extrinsic and intrinsic factors by the worm. He therefore carried out tests on ten patients with pernicious tapeworm anaemia to find whether the additional feeding of normal gastric juice as a source of intrinsic factor, mixed with meat or yeast as a source of extrinsic factor, would exert any influence on the anaemic condition.

It was found that while in each of the cases of cryptogenetic pernicious anaemia the treatment produced a significant remission which was equally good whether the mixture was incubated or not, there was no response in the patients with pernicious tapeworm anaemia, their blood values

continuing to decline whether the mixture had been incubated or not. After expulsion of the worm, meat or yeast extract was fed alone for eight days and there was then a significant and steady improvement in blood values.

The author concluded that the interaction of the intrinsic and extrinsic factors must be inhibited by the worm in cases of pernicious tapeworm anaemia and considered that this inhibition probably took place at the intestinal wall.—F. E. W.

VIII. The addition of fresh or dried *D. latum* has not the power to nullify the antianemic effect of mixtures of extrinsic and intrinsic factors when given to patients with cryptogenetic pernicious anemia ; the administration of dried worm does not hinder the remission after worm cure in pernicious tapeworm anemia, and the admixture of dried worm to hog's stomach preparations does not diminish their therapeutic effect.

IX. Experiences from abdominal operations and from autopsies show that in human beings *D. latum* is most frequently found in the ileum and rarely in the jejunum. The worm can also develop in the gall bladder.

HIRVONEN, M. (1947.) **[Observations throwing light on the pathogenesis of pernicious tapeworm anaemia.]**—*Ann. med. Intern. Fenniae.* **36.** 53–65. [Abst. in *Trop. Dis. Bull.* **45.** 450. (1948), copied *verbatim*. Signed : G. LAPAGE.] **2978**

Diphyllobothrium latum is, the author says, very common in Finland, yet people infested with it seldom have anaemia. EHRSTROM, quoted by von Bornsdorff cited below, calculated that only 1 patient in 5,000 to 10,000 is ill with tapeworm anaemia, but SEPPÄ'S estimate is 1 in 659 and TÖTTERMAN'S 1 in 113 to 1 in 383. SALTZMAN and VON BONSDORFF ascribe this incidence either to " an abnormal character of the worm or to a ' constitutional ' disposition of the host." The latter explanation was supported by SCHAUMAN (quoted by von Bonsdorff and Saltzman), but has not been proved. The present author describes one case which, in his opinion, " indicates very clearly " that " the abnormal character of the worm " decisively influences the genesis of tapeworm anaemia. This case was a woman aged 23, whose anaemia disappeared after administration of filicin, which failed to remove the whole worm ; she had no anaemia when she returned 1½ years later for further treatment for removal of what the author considered to be the same tapeworm. He suggests that the anaemia in this case may have been caused by some " disease " of the tapeworm and that the anthelmintic may have cured this, so that the patient's anaemia disappeared.

Three other patients are also discussed, all of whom had free HCl, so that pernicious anaemia was absent. In all three cases, blood regeneration ceased after the worm cure and only continued when liver treatment was given. Examination of these cases 4, 6 and 7½ months respectively after cessation of the liver treatment showed that all were completely healthy. The author discusses these cases in relation to the view that *D. latum* destroys all the antianaemic liver factor at the patient's disposal and suggests the alternative hypothesis that the " worm poison has a paralysing effect upon the blood-forming organs, the bone-marrow and the liver ", which were strong enough in these 3 cases to begin regeneration of the blood, but not strong enough to complete this without the help of liver treatment.

CHARLES, G. (1948.) **Keratitis in vealers following the use of phenothiazine.**—*Yearb. Inst. Insp. Stk N.S.W.* 1948. p. 82. **2979**

This is a note recording the development of keratitis in seven of 40 veal calves treated with phenothiazine. The condition resembled that described by WHITTEN & FILMER [*V. B.* **18.** 507]. —D. F. STEWART.

ANON. (1945.) **Control of trichostrongylosis in sheep. The use of phenothiazine and tetrachlorethylene as substitutes for nicotine.**—*Aust. vet. J.* **21.** 116–119. **2980**

Owing to short supplies of nicotine sulphate and phenothiazine during 1945 it was necessary to use tetrachlorethylene and to conserve phenothiazine. Information is provided on the preparation, dose rates and methods of administration of phenothiazine. Special attention is directed to methods for avoiding staining of the fleece.

Methods are described for the administration of tetrachlorethylene after a dose of copper sulphate which is necessary for bringing about reflex closure of the oesophageal groove. Tetrachlorethylene is not effective unless swallowed into the abomasum. The after-effects of tetrachlorethylene are discussed.

A regular programme of treatments against *Trichostrongylus* spp. includes drenching of ewes before lambing, of lambs at weaning time and of young sheep during autumn and winter. A special treatment is required three weeks after a good fall of rain.—H. McL. GORDON.

MCBARRON, E. J. (1948.) **Nervous disorders associated with roundworm infestation in horses.**—*Yearb. Inst. Insp. Stk N.S.W.* 1948. pp. 83–85. **2981**

The death of a horse following symptoms simulating epileptiform seizure is described. P.M. examination revealed a very heavy infestation with *Ascaris equorum*. Examination of the faeces of another horse subject to similar fits revealed numerous ascarid eggs. Following appropriate treatment no further attacks were observed in a period of 18 months.—D. F. S.

FOSTER, A. O., ENZIE, F. D., HABERMANN, R. T., & ALLEN, R. W. (1948.) **The status of the sodium fluoride treatment for removal of large roundworms from swine.**—*Amer. J. vet. Res.* **9.** 379–385. **2982**

This paper serves as a summary of American research work on the subject. In short, sodium fluoride has in field trials removed 2,264 out of 2,369 ascarids from 308 pigs and 3,361 out of 3,903 stomach worms from 43 pigs, these figures representing efficiencies above 92%. The drug is ineffective against *Oesophagostomum, Trichuris* and *Macracanthorhynchus*. It is always given dry, mixed in a dry feed in a proportion of 1% and this medicated feed is given for one day only. Toxic reactions are infrequent: vomiting occurred in 10% of treated pigs and in a like proportion the drug had a laxative effect.—J. E.

See also abst. **3084** (echinococcus)

SPONTANEOUS AND TRANSMISSIBLE NEOPLASMS AND LEUCAEMIAS [INCLUDING FOWL PARALYSIS]

BLACK, M. B. (1949.) **Adenoma of ceruminous gland in the dog.**—*Arch. Path.* **48.** 85–88. [Author's summary slightly modified.] **2983**

A tumor of the ceruminous glands of a dog is here described in detail. Four similar tumors of 3 dogs and a cat have been reviewed and are reported for the first time. Tumors of ceruminous glands have received little study. They are exceedingly rare in man, but several veterinarians have expressed the opinion that they are of common occurrence in the dog.

MULLIGAN, R. M. (1948.) **Neoplastic diseases of dogs. II. Mast cell sarcoma, lymphosarcoma, histiocytoma.** — *Arch. Path.* **46.** 477–492. [Author's summary copied *verbatim*.] **2984**

Mast cell sarcoma is a neoplasm characterized as follows: 1. It occurs in dogs usually 6 years of age or older. 2. Its incidence is greater in female dogs. 3. It shows a predilection for the Boston terrier, especially the female of the breed. 4. It has a tendency to involve the extremities (usually the hindlegs), the scrotum, the flanks, the vulva and the eyelids. 5. It reaches a size of 10 cc. or more in about 70 per cent of cases. 6. Its growth is rapid; it is poorly delineated from surrounding tissues; there is a strong tendency for it to recur after excision; frequently the surface is ulcerated; the cut section is firm, lobulated, whorled, gray, pink-gray or white; there is multiplicity of growth in about 8 per cent of cases and involvement of regional lymph nodes in over 15 per cent of cases. 7. There is anaplasia of the constituent neoplastic mast cells as exemplified by size, number and ease of staining of specific granules, the ratio of nuclear size to cytoplasmic volume, the variation of the size and the number of nuclei, the multiplicity of nucleoli, the chromatin pattern and mitosis. 8. There is increased anaplasia in recurrent neoplasms.

Lymphosarcoma is a neoplasm which occurs usually in dogs 6 years of age or older; is perhaps more common in male and spayed female dogs; has a tendency to affect most often the Scotch terrier and the cocker spaniel; has a swiftly developing course and a fatal termination; always involves lymph nodes, often the spleen and the liver and less commonly other organs and tissues; attains large and symptom-producing size most frequently in lymph nodes; consists of lymphoblasts or of lymphocytes with characteristic cytologic features, and rarely gives rise to leukemic manifestations.

Histiocytoma is a neoplasm found predominantly in dogs 2 years of age or younger; is apparently more common in males; seems to favor the cocker spaniel; is usually located on the extremities, the face and the thorax, but seldom on the genitalia; is less than 5 cc. in volume in over 80 per cent of the cases; is acquired; grows rapidly, does not recur after excision and may regress spontaneously; is firm, white or gray and often ulcerated, and consists of neoplastic histiocytes with hazy borders, fairly abundant cytoplasm and nuclei of varying shape, which display homogeneous fine chromatin, small nucleoli and frequently mitotic figures.

DAYKIN, P. W., & SMYTHE, R. H. (1949.) **Testicular neoplasm associated with sex inversion in the dog.**—*Vet. Rec.* **61.** 325–326. **2985**

The authors suggest that the testicle may on occasion produce an oestrogen. They used luteinizing hormone on cases of sex inversion associated with testicular neoplasia and state that they obtained spectacular results, the dogs resuming all their former masculinity after treatment. —A. R. JENNINGS.

SMITH, F. W., GARDNER, W. U., LI, M. H., & KAPLAN, H. (1949.) **Adrenal medullary tumors (pheochromocytomas) in mice.**—*Cancer Res.* **9.** 193–198. [Authors' summary copied *verbatim*.] **2986**

Four large pheochromocytomas were found in the adrenal glands of mice of different strains or hybrid groups that had been either castrated or irradiated (750 roentgen units in 12 days).

Small adrenal medullary lesions, histologically

not unlike the large tumors, were noted in 5 other castrated or irradiated mice. These lesions are thought to be small pheochromocytomas.

LUSHBAUGH, C. C., & STEINER, P. E. (1949.) **Intraocular transplantation of malignant lymphomas of the mouse, dog, and man in heterologous species.**—*Cancer Res.* **9.** 299–305. [Authors' summary copied *verbatim.*] **2987**

Intraocular transplantations in 7 cases of human malignant lymphomas (leukemia, lymphosarcoma, and Hodgkin's disease), 1 canine malignant lymphoma, and 2 leukemias of mice were unsuccessful in alien species (guinea pigs, rabbits, dogs, and mice). The mouse leukemias were transplantable in the eyes of homologous and heterologous strains of mice, but regression of the disease occurred rapidly in the latter strain. Histologic fate of transplants was rapid necrosis and partial resorption followed by organization of the debris.

The interpretation given to these experiments is that the failure of successful intraocular transplantation of malignant lymphomas in alien species was the result of the short life span of the cells, their high susceptibility to adverse conditions, and their antibody-engendering capacity, rather than to lack of a high degree of malignancy and autonomy.

This procedure was not of value in differential diagnosis.

STEVENS, C. D., LEE, A., STEWART, P. H., QUINLIN, P. M., & GILSON, P. R. (1949.) **The distribution of radio-activity in tumor-bearing mice after injection of radioactive iodinated trypan blue.**—*Cancer Res.* **9.** 139–143. [Authors' summary copied *verbatim.*] **2988**

The distribution of radioactivity in the tissues of 24 Swiss A mice, each bearing two subcutaneous implants of tumor 15091a, and 5 control mice was measured after intravenous injection of a radioactive dye mixture prepared by iodination of trypan blue in the presence of radioactive iodide. The tumor tissue showed several times as high a concentration of radioactivity as did the skeletal muscle or skin, but less than the liver, spleen, or kidneys. The data are compared with those obtained by others using radio-brominated trypan blue and Evans blue to show the similar behavior of these different radioactive dye preparations.

SKIPPER, H. E., & CHAPMAN, J. B. (1949.) **Carbamates in the chemotherapy of leukemia. VI. The influence of urethan and blood acid-base equilibrium on mouse chloroleukemia 1394.**—*Cancer Res.* **9.** 158–161. [Authors' summary copied *verbatim.*] **2989**

The temporary experimental urethan-alkalosis reported by Hawkins and Murphy has been confirmed.

Treatment with sodium bicarbonate and ammonium chloride at levels which will temporarily affect the blood acid-base balance failed to significantly increase the survival time of mice with transmitted chloroleukemia 1394.

Administration of ammonium chloride concomitantly with urethan for the purpose of temporarily overcoming urethan alkalosis did not appear to adversely affect the anti-leukemic action of urethan for chloroleukemia 1394 in mice.

NUTRITIONAL AND METABOLIC DISORDERS

SEARS, P. B. (1949.) **Soils and health.**—*Canad. med. Ass. J.* **60.** 88–90. **2990**

The value of the Kentucky Blue Grass region lies in the abundant calcium and phosphorus of the soil. Where these have been exhausted, the best pedigrees and trainers fail to produce winners. Also in such areas as the phosphate basin of Tennessee, the limestone regions of Missouri and Texas, and the Osage Hills of Oklahoma, livestock is vigorous and the people prosperous. Each of these areas is surrounded by mineral-deficient soils and the bone weight of livestock of identical age and breeding reared on these deficient soils may be only one-half of normal, such contrasts occurring within 100 feet of each other. The vitamin and fat contents of milk respond to dietary differences but the situation with respect to minerals in milk is not so clear. Cobalt is essential for sheep, 0·1 mg. daily makes the difference between life and death. S. emphasizes the need to return all sewage, after suitable treatment, to the land.—R. GWATKIN.

WEBB, R. J., LEWIS, J. M., KAMMLADE, W. G., FUELLEMAN, R. F., & HAMILTON, T. S. (1948.) **The level of soil fertility and its relation to plant and animal production.**—*J. Anim. Sci.* **7.** 159–169. **2991**

These experiments were done on land in southern Illinois reputed to be deficient in essential minerals. They extended over four years and attempted to assess (a) any existing deficiencies in terms of the health and reproduction of sheep, and (b) the effect of applications of calcium and phosphate upon the vegetation and the animals. Six ten-acre fields of uniform soil were used: two were untreated, two were dressed with limestone and superphosphate, and two with limestone plus a smaller amount of superphosphate. Each pair of fields was used alternately for grazing and for a hay crop to feed the same test

animals (breeding ewes and lambs) during the winter. Various minor changes in this plan were necessitated by drought and similar uncontrollable factors. In general, the results indicated that the uptake of minerals by plants was not necessarily determined by the mineral content of the soil; many other factors were influential, and artificial fertilization of soil tended to increase yield rather than to affect the chemical composition of herbage. Some changes in the latter may have occurred, but were not sufficiently marked to affect the composition of the bone ash, serum phosphate, or reproductive performance of the experimental animals.—E. Parker Pollard.

Metcoff, J. (1949.) **Influence of protein nutrition on experimental infection. Physiological aspects.**—*Amer. J. publ. Hlth.* **39.** 862–865. [Author's summary copied *verbatim*.] **2992**

Under the conditions of these studies, protein deficiency did not appear to alter the susceptibility, resistance, course, or physiopathologic responses to either *Salmonella* or tuberculosis infections in the young growing rat.

Van Der Wath, J. G. (1948.) **Studies on the alimentary tract of Merino sheep in South Africa. XI.—Digestion and synthesis of starch by ruminal bacteria.**—*Onderstepoort J. vet. Sci.* **23.** 367–383. **2993**

A study of the bacterial digestion of starch in the rumen of Merino sheep revealed that the main organisms concerned are iodophilic streptococci which in a few hours become packed round the starch grains. Disintegration of the starch granules begins after five hours and is completed in 18–20 hours. The diameter of the starch granules influences their rate of disintegration, the larger granules being digested more slowly. It was observed that fructose and glucose were most readily assimilated by the iodophilic organisms; assimilation of starch, pectin and cellobiose was delayed; pentoses were not assimilated. The dominant iodophilic organism was found to be a small coccus which was isolated in pure culture and its characteristic noted.—J. A. Nicholson.

Benditt, E. P., Wissler, R. W., Woolridge, R. L., Rowley, D. A., & Steffee, C. H. (1949.) **Loss of body protein and antibody production by rats on low protein diets.**—*Proc. Soc. exp. Biol., N.Y.* **70.** 240–243. **2994**

Young adult male albino rats of 200–220 g. were fed a low protein diet, which was in other respects sufficient to support normal growth. 15 g. of food were offered daily to each animal for the first 30 days; 20 g. thereafter. Consumption of the ration was complete until 25% of the body weight had been lost, but fell thereafter, though never lower than 72% of the diet.

Groups of five animals were studied at varying times up to 100 days after the dietary régime was started. In each case the animals were immunized against sheep's erythrocytes and Friedländer's bacillus. Six days later haematological and serological studies were made, and after a further five days the animals were killed and the protein estimated in the blood, liver and carcass.

It was found that antibody titres "fell" more rapidly after protein deprivation, than did the circulating, liver or carcass proteins by about 10–13 times. Therefore, the estimation of concentration of serum protein or its constituents, for example, would be no index of antibody production under circumstances of protein deprivation. Significant depression of agglutinin titre did not occur until the 17th day of diet reduction, nor of the haemolysin titre until the 30th day.

The rate of loss of liver and plasma protein and of haemoglobin were approximately equal, and about twice as fast as that of carcass protein.—G. Fulton Roberts.

Watson, C. J., Kennedy, J. W., Davidson, W. M., Robinson, C. H., & Muir, G. W. (1949.) **The nutritive value of nitrogenous compounds for ruminants. I. The nutritive value of urea as a protein supplement.**—*Sci. Agric.* **29.** 173–184. **2995**

Watson, C. J., Davidson, W. M., & Kennedy, J. W. (1949.) **The nutritive value of nitrogenous compounds for ruminants. II. The formation of body protein from urea labelled with the isotope N^{15}.**—*Ibid.* 185–188. **2996**

I. The value of urea as a protein substitute was investigated by means of feeding and slaughter trials, using 30 calves and 60 lambs. The animals were divided into groups of five. They were fed a basal diet poor in nitrogen, until their weights were constant. Two in each group were killed and analysed. Of the remaining three in each group, one received a basal ration poor in nitrogen, one received the same ration with the addition of urea, and one received the same ration with the addition of casein with the same digestible nitrogen content as the urea-fed animal. The total digestible nutrients in the rations were equalized by the removal of starch and oil in the case of the urea and casein supplemented diets. These rations were fed for 50 weeks and the animals were slaughtered, the carcasses weighed, analysed and compared with the initial weights and composition of the animals slaughtered at the commencement of the trial.

The calves fed on a nitrogen-poor ration maintained good health and made small weight gains with some increase in fat, but had practically no deposition of protein or ash. The animals

receiving urea supplement made relatively good gains in weight of protein, ash and water content of their carcasses. The animals on casein supplemented diet had the greatest gains in weight of protein, ash and water.

The experiment on sheep on an identical plan was unsuccessful and inconclusive because of the refusal of the sheep to consume more of the ration than required for maintenance only.

The carcass weight gains of the animals fed on the urea supplemented diet over the animals fed on the basal diet were statistically significant, and the authors conclude that urea can act as a substitute for protein in the diet of cattle, its value being less than that of protein.

II. The increase in deposition of protein in animals fed a urea-supplemented diet could have three explanations. The nitrogen in the urea could be used to form protein through the agency of the microflora of the rumen; it could have increased the activity of the microflora to the extent that they would have greater action on the roughage and liberate N from it; or the microflora could have used N from the urea, in place of N from the feed.

Urea labelled with N^{15} was prepared and fed to sheep for four days. They were slaughtered and their plasma and organs analysed for the presence of protein containing N^{15}. The liver, blood and kidneys contained significantly more N^{15} than normal. It is concluded from this that the urea was utilized by the sheep for the formation of body proteins.—G. A. Linton.

Ellis, G. H., Smith, S. E., & Gates, E. M. (1947.) **Further studies of manganese deficiency in the rabbit.**—*J. Nutrit.* **34.** 21–31. [Authors' summary copied *verbatim.*] **2997**

Manganese deficiency in the rabbit was studied using the paired-feeding technique with a basal diet of milk.

Of the unsupplemented diet there was a lowered arginase activity of the liver and a lowered "alkaline" phosphatase activity of the ulna. The latter finding is associated with impaired bone formation noted in the gross as crooked front legs. The fresh weight, percentage ash, total ash, density and length of the humerus was significantly lower in the manganese-deficient animals.

Though the food intake of the 2 groups was equalized, the controls gained more weight than those fed the low-manganese diet.

In the manganese-deficient animals the concentration of manganese in the liver and in the femur was much reduced, while that in the blood serum was not.

In other experiments in which the feed intake was not equalized, no significant differences were found for the following: "acid" or "alkaline" phosphatase activity of the blood serum, kidney, liver, or small intestine; hemoglobin concentration of the blood; inorganic phosphorus of the serum; incidence of testicular degeneration.

Reid, J. T., & Ward, G. M. (1948.) **Mineral metabolism studies in dairy cattle. III. Manganese metabolism in the lactating bovine.**—*J. Nutrit.* **35.** 591–596. [Authors' summary copied *verbatim.*] **2998**

A study was made of the metabolism of manganese in 12 cows at 3 intervals each during the first 5 months of lactation.

Lactating cows retained $154{\cdot}4 \pm 9{\cdot}8$ mg. manganese daily; about the same quantity of manganese was used regardless of the quantity of the element ingested. The amount of manganese excreted in the feces was found to be directly proportional to the amount of manganese ingested in the range of 622·4 to 1325·6 mg. daily; the correlation coefficient for this relationship was $0{\cdot}958 \pm 0{\cdot}014$. An equation is presented which allows the quantity of manganese excreted daily (and, conversely, the amount retained) to be calculated when the daily intake is known for cows receiving diets similar to those used in this investigation.

Reid, J. T., Ward, G. M., & Salsbury, R. L. (1948.) **Mineral metabolism studies in dairy cattle. IV. Effects of mineral supplementation of the prepartal diet upon the composition of the blood of cows and their calves at parturition.**—*J. Nutrit.* **36.** 75–89. [Authors' summary copied *verbatim.*] **2999**

A study was made of the effects of calcium and of calcium with various trace elements in the prepartal diet upon the composition of the blood of 50 calves and their 49 dams immediately following parturition.

Mineral supplements fed for at least 2 months prepartum did not elicit perceptible effects upon the levels of calcium and inorganic phosphorus in the plasma of the newborn calves or of their dams. Of a number of whole blood and plasma constituents studied, the outstanding group differences found were the lower levels of reduced and total glutathione in both the cows and calves of group III (calcite flour[10] supplemented) than in those of the other groups (basal diet alone, calcium carbonate supplemented, Mico[11] supplemented). [Calcite flour has the average percentage composition of:– Ca 33; Mg 2·6; Mn 0·02; Fe 0·2; Cu 0·002 and Zn 0·02. Mico has the average percentage composition of Ca 33; Mg 2; Mn 0·2; Fe 0·2; I 0·045; Cu 0·025; Zn 0·01 and Co 0·002.]

Greater concentrations of reduced and total glutathione, calcium, inorganic phosphorus, acid and alkaline phosphatase, and ascorbic acid and

a greater number of erythrocytes were found in the blood of newborn calves than in that of their dams; a greater corpuscular hemoglobin content, corpuscular volume, and a higher plasma level of total proteins, globulin and albumin were found in cows than in their calves immediately after parturition.

Similar concentrations of the various blood constituents studied were found regardless of the sex of the new born calf.

Seven calves which received colostrum prior to the procurement of blood for analyses at an average age of 4·5 hours had strikingly higher plasma levels of total protein, globulin and albumin than those which had not been nursed by their dams. The blood of the calves which had ingested colostrum contained slightly less haemoglobin, smaller numbers of erythrocytes and a smaller proportion of the whole blood volume consisting of erythrocytes than the other calves, which may have been due to dilution of the blood. Small quantities of globulin [precipitable by half-saturated $(NH_4)_2SO_4$] were demonstrable in the plasma of newborn calves prior to the ingestion of colostrum.

SCHMIDT, H. (1947.) **Phosphorus deficiency in cattle.**—*Fed. Vet.* **4.** No. 5. pp. 1, 5 & 6. [Reprint *Texas vet. Bull.*] **3000**

This is an account of phosphorus deficiency in cattle in Texas, U.S.A. The amount of phosphorus in the soil is reflected in the phosphorus in the plant. When it is not possible to use phosphorus as a fertilzer other phosphorus supplements are used in the form of protein concentrates such as cotton seed meal, linseed meal, pea-nut meal or bone meal. Under these conditions cattle become phosphorus deficient as reflected by the concentration of phosphorus in the blood.

It has been found possible to induce a phosphorus deficiency in animals subsisting in limestone areas where the concentration of calcium in plants is very high. In consequence the protein content in the plant is reduced and in the animal also.

There is another condition called loin disease of cattle which is also due to a phosphorus deficiency. The cause is a toxin which is induced in the animal by eating putrid carcass material and the disease was remedied by the daily feeding of phosphorus-bearing supplements. A mixture of two parts bone meal to one part fine salt was effective and losses from loin disease were controlled. On the whole the bone meal consumption varied with the seasonal phosphorus content of the grass.

When the phosphorus and protein content was high in the spring the bone meal consumption dropped to almost nil. At this time the control cows would also stop chewing bones. After a few months when the grass got tougher, bone meal consumption and the bone chewing habit was resumed.—G. D. SHEARER.

OBEL, A.-L. (1947.) En morfologisk studie av rakitis hos kalv. [**The morphology of rickets in calves.**]—*Skand. VetTidskr.* **37.** 483–500. [English summary copied *verbatim.*] **3001**

The author gives a short account of the normal bone development and modern opinions regarding rachitis, and points out that true rachitis, from a morphological point of view, occurs in calves. The changes take place, in calves, from the age of two months. In a material covering 305 calves, 15 cases of rachitis were discovered in calves of 2–4 months, whereas none were registered among newborn calves. The conclusion can, therefore, be drawn that rachitis cannot be congenital. Osteoporosis was present in 7 of the cases. The etiology of this change is debatable: a deficiency in vitamin A and deficiency in calcium and phosphate is, in the first place, to be suspected.

Rachitis in calves occurs, as a rule, in connection with indigestion in the rumen and general anemia; in most of these cases, death is due to intoxication from the rumen. Rachitis alone cannot be considered as a fatal disease, but it can easily be the cause of external deformations on account of disturbances in the enchondral bone development.

BONFANTE, G. (1949.) Vitamina D_3 e vitamina D_2 nella profilassi e terapia del rachitismo sperimentale del suino. [**Vitamins D_3 and D_2 in the therapy of experimental rickets in swine.**] —*Zooprofilassi.* **4.** No. 3. pp. 1–28. [English summary.] **3002**

Twelve young pigs of an average weight of 8 kg. were kept in dark stables without sunlight and fed over a period of 112 days on a rachitogenic diet with a calcium-phosphorus ratio of 1 : 8, consisting of 300 g. of rye bran, 10 g. of oats, 180 g. of maize meal, 1·7 g. of salt and 1,600 g. of water.

The diet of three pigs was supplemented with daily doses of 4,000 I.U. of vitamin D_3 and three others were given an equivalent supplement of vitamin D_2 instead.

The pigs given vitamin D_3 remained normal and all the remaining ones developed signs of more or less serious rickets.

Three of the rachitic pigs were given three doses of 400,000 I.U. of vitamin D_2 at intervals of ten days and three others the equivalent doses of vitamin D_3 and steady improvement was noted in all six.—E. G.

HEPDING, L. (1947.) Vitamin E-Mangel bei Hühnerküken, insbesondere über Therapieversuche mit Vitamin E bei den zerebellaren

Störungen. **[Vitamin E deficiency in chickens and experimental vitamin E treatment of cerebellar disturbances.]**—*Berl. Münch. tierärztl. Wschr.* No. 8. pp. 88–91. **3003**

H. reviews the literature on vitamin E deficiency symptoms in chicks and gives an illustrated report on his own experimental work, concluded in 1940. While vitamin K failed to influence the exudative-haemorrhagic syndrome, the cerebellar disturbances (both incipient and existing), yielded promptly and completely to large doses of dl-α-tocopherol acetate.—G. P. M.

STEELE, J. R. (1948.) **Use of B vitamins in standardbred horses. (A preliminary clinical report.)**—*Vet. Med.* **43.** 361–364. **3004**

Eight cases are described to which a proprietary preparation containing thiamine, riboflavin, pyridoxine, calcium pantothenate, nicotinic amide and ascorbic acid was given intravenously. Six were race horses with symptoms of cramp or tetany of the gluteal muscles, one a stallion " in poor condition " and one a gelding having repeated episodes of diarrhoea and anorexia. In all cases treatment appeared to be beneficial. Emphasis is placed on the use of vitamin mixtures in contradistinction to that of single compounds.—P. H. HERBERT.

SCHAEFER, A. E., SALMON, W. D., & STRENGTH, D. R. (1949.) **Interrelationship of vitamin B_{12} and choline. I. Effect on hemorrhagic kidney syndrome in the rat. II. Effect on growth of the chick.**—*Proc. Soc. exp. Biol., N.Y.* **71.** 193–196; & 202–204. [Authors' summaries copied *verbatim*.] **3005**

I. The incidence and severity of renal injury in weanling rats fed diets low in choline and methionine were markedly decreased by supplementing the diet with a vitamin B_{12} concentrate or crystalline vitamin B_{12}.

Under the conditions of these experiments, 30 μg of vitamin B_{12} per kg of diet could replace about one-half of the supplementary choline or methionine required for protection against kidney damage. When sub-protective levels of choline were fed, the addition of vitamin B_{12} caused a significant increase in weight gain. However, when an adequate protective level of choline was fed, no increase in weight gain was obtained from the addition of the vitamin.

The results established the existence of an interrelationship between vitamin B_{12}, and choline or methionine.

II. Vitamin B_{12} was fed to Leghorn chicks receiving a choline-low basal diet supplemented with ·6%, ·2%, ·1%, and ·05% choline chloride. The 14-day increment in weight gain over the controls that did not receive vitamin B_{12} was 26 g, 32 g, 63 g, and 21 g, respectively.

Crystalline vitamin B_{12} fed at a level of 15 μg per kg of diet and at a choline level of ·1% was as effective as vitamin B_{12} concentrate in a 2-week feeding period. The choline requirement of chicks under the conditions of these experiments was markedly reduced by the supplementation of the diet with vitamin B_{12}. It appears that dietary choline has a significant sparing action on vitamin B_{12}.

ROBERTSON, A., DONALD, D. E., INGLIS, J. S. S., & PAVER, H. (1948.) **Etiology of grass sickness. [Correspondence.]**—*Nature, Lond.* **162.** 116. **3006**

The authors report that by ligature of the ileum in ponies they reproduced the main clinical, biochemical and P.M. findings of grass sickness. They refer to Ferguson's findings regarding a paralysing action of grass juices on rabbit intestine [see *V.B.* **19.** 26.] and speculate on the possibility that some such action by young actively growing grass may be concerned in the causation of grass sickness in horses.—M. C.

ROBERTSON, A. (1949.) **Some observations on milk fever.**—*Vet. Rec.* **61.** 333–337. [Discussion pp. 337–339.] **3007**

R. gives a review of milk fever (M.F.) therapy, and discusses particularly cases which fail to respond to Ca therapy. Serum concentrations of Ca, Mg, K, Na and phosphates were estimated before and after calving in an unspecified number of cows, and a previous report of a fall in Ca and phosphate concentrations at parturition was confirmed [see DUCKWORTH & GODDEN, *V.B.* **10.** 629.] R. also confirmed the reports of FISH (1929) that udder inflations cause a rise of both serum phosphate and Ca, the rise of phosphate being the greater. This implies that udder inflation does not act purely mechanically, since colostrum contains more Ca than phosphate and the damming back of milk secretion would be expected to increase serum Ca more than serum phosphate. R. reports significant increases of serum phosphate after the usual Ca therapy. Of two cases which remained recumbent after Ca treatment, one responded to udder inflation, and the other to sodium dihydrogen phosphate plus Ca; in both cases there was marked rise of serum phosphate at the time of clinical recovery. Phosphate therapy is indicated in this type of M.F. R. found no relation between nervous symptoms and serum Mg concentration and concluded that Barker's (1948) classification on this point cannot always be applied.

In the discussion Boddie suggested that udder inflation is effective by means of an unknown nervous reflex, or hormone release, or both. Stewart presented scatter diagrams inter-relating serum concentrations of Ca, Mg and phosphates

in 40 selected M.F. cases. He claimed that non-clinical hypomagnesaemia is a common herd characteristic; and in individuals in these herds this may be exacerbated to clinical hypomagnesaemia by the stimulus of parturition. S. also recommended phosphate therapy for parturient red-water of cows since this disease is characterized by hypophosphataemia.

Anderson claimed that the beneficial effect of udder inflation is simulated sometimes by inflated intestines or bladder. This also argues against the "damming back of Ca" theory of inflation of the udder.

[There is a mistake in one calving date in Table II.

R. does not describe his chemical methods. The phosphate and magnesium figures given imply an accuracy of 1 part in 1,000,000,000, which is far beyond that of the usual methods].

—R. J. FITZPATRICK.

See also abstr. **2878** (resistance to infection); **2879** (vitamin A and swine dysentery); **2905** (thiamine); **3069** (vitamin E and sterility); **3085** (proteins and amino acids); **3087** (bibliography on trace elements).

DISEASES, GENERAL

ROSEBURY, T. (1947.) **Experimental air-borne infection.** pp. xi + 222. Baltimore: The Williams & Wilkins Company. $4.00. **3008**

The outbreak of war in 1939 brought an increase in the risk of widespread epidemics of air-borne infections. Investigations into the problems of the role of aerial particles, which had already been commenced, were intensified. A partial account of the results obtained in Great Britain was published in a Medical Research Council Special Report, No. 262, entitled "Studies in Air Hygiene" [BOURDILLON *et al.*, *V. B.* **19.** 234.]

This book by Rosebury reveals the nature of similar investigations undertaken by a team of American scientists at the Laboratories of Camp Detrick, Maryland. It contains a mass of valuable technical detail of the special apparatus evolved and the results obtained with carefully selected bacteria and viruses.

The observations fall conveniently into four main groups. After an opening chapter on the historical background, there is a section on equipment and methods. The over-riding consideration throughout the investigations has been the safety of the personnel, and most elaborate precautions were adopted to avoid any chance of accidental infection. The basis of the apparatus evolved for exposing small animals to clouds of infective particles is the chamber devised by Reyniers for raising germ-free animals. Full details are given of the modifications incorporated to permit atomization of infective suspensions, sampling of the mists, the introduction and withdrawal of animals under conditions calculated to prevent the escape of infective droplets and so on. These details should be consulted by interested workers and compared with the similar types of apparatus devised by British workers. It may be mentioned that the American set-up requires at least four attendants for each run.

A section describes the performance of nebulizers and the means adopted for securing reproducible graded infections. Then follows a chapter on cloud sampling devices. Preference is given to impinger samplers which have the advantage that in addition to their use in the estimation of the number of infective particles carried by a given volume of mist, they also act as stabilizers of the system and fix the rate of flow of the air current.

Data are given on the infectivity by the respiratory route of a number of bacteria—*Brucella suis*, *Pfeifferella whitmori*, *Pf. mallei*, *Pasteurella tularensis* and of two viruses—meningopneumonitis and psittacosis. The author rightly draws attention to the fact that the precision of the methods can be greatly improved by careful attention to the technique of producing the clouds, but that significant deviations always arise owing, partly, to the inactivation of infective particles through drying when the fluids are nebulized, and partly to biological variability, particularly in the respiratory volume of animals. These factors which are difficult to control are bound to introduce errors of some magnitude.—R. E. GLOVER.

HURST, E. W. (1944.) **A review of some recent observations on demyelination.**—*Brain.* **67.** 103–124. Reprinted in *Inst. Med. Vet. Sci., S. Aust.* Collected papers. Vol. 3. (1944–1947.) **3009**

This is a critical review of the problems of demyelinating diseases and represents H.'s considered reflections on the subject. It should be read by all interested in demyelination diseases of animals. On account of lack of knowledge on aetiology, E. doubts the wisdom of classifying the numerous clinico-pathological varieties in man on a basis of finer histological appearances. There are indications that we are beginning to know more about demyelination as a process. The vascular blockage theory enunciated mainly by Putnam is discussed at length, but H. doubts the validity of comparing the lesions produced experimentally with those in disseminated sclerosis. The effects of anoxia on myelin, by using cyanides (Ferraro)

and sodium azide (Hurst) are significant. Necrosis at the one extreme and demyelination at the other can be produced, depending on dose and repetition of dosage. The same effects may be seen in CO poisoning. The white matter possesses less recuperative power than the grey so that repeated " insults " which may only damage the latter may cause severe demyelination or necrosis.

Anti-rabic vaccination demyelinating encephalitis is a problem of importance in man and in dogs. This has given rise to the idea that demyelination may be associated with development of specific antibodies for nervous tissue. Rivers produced demyelination in monkeys by repeated injection of heterologous normal brain emulsions. Others have repeated this, some confirming it in the same animals but others have not in other animals. [The recent work of KABAT *et al.* (*V. B.* **18.** 301.) is of the utmost importance as they have produced acute severe demyelinating encephalopathy in monkeys by a single injection of homologous or heterologous brain emulsion with adjuvants].

The possibility that allergy may be involved in demyelination is discussed. Some attention is given to the production of demyelination by snake and bee venom and by tetanus toxin. Consideration is also given to the role of viruses in demyelination, in particular to the role of the distemper virus in the causation of canine encephalitis based on H.'s own work. [This must be tempered by the recent work of MACINTYRE *et al.*, see *V. B.* **19.** 401. See also INNES, *V. B.* **19.** 401.] There are also some brief comments on biochemical studies in demyelination.—J. R. M. INNES.

BIGGERS, J. D., & INGRAM, P. L. (1948.) **Studies on equine purpura haemorrhagica. Review of the literature. I.**—*Vet. J.* **104.** 214–221. **3010**

This review of the literature on purpura haemorrhagica is provided with an extensive list of references. It appears that the first clear description of the condition under its modern name was given by Field in 1839 though Gibson in 1785 described a " putrid fever " which probably was the same disease.

The majority of the recent communications on equine purpura have been case reports.

The current views on the cause of purpura fall into three groups : it is (1) a chronic intoxication as a result of a previous bacterial infection probably streptococcal, (2) a condition of anaphylactic origin and (3) a dietary deficiency possibly of ascorbic acid or the P-factor.

The causative factor, whatever its nature produces its effects on the blood clotting mechanism or on the peripheral blood-vessels.—E. J. H. FORD.

GIBBONS, W. J. (1949.) **X-disease of cattle.**—*Auburn Vet.* **5.** 63–66, 80–83. **3011**

G. gives a general account of X-disease (hyperkeratosis) in cattle in the U.S.A. The condition is generally chronic and is highly fatal. It occurs only in cattle, generally in younger animals. It has been diagnosed in 32 of the States. It has been present for at least eight years and probably much longer. It is characterized by lachrymation, emaciation, ulcerative and proliferative stomatitis, oesophagitis, enteritis and a hyperkeratosis. The latter causes the typical dry, crusty and thickened skin. The economic loss occasioned by the disease has caused the U.S. Department of Agriculture to set up committees and promote a survey in respect of the disease.

The cause is unknown.—A. H. HOGG.

ROGERS, E. S. (1948.) **Losses associated with dipping in DDT.**—*Yearb. Inst. Insp. Stk N.S.W.* 1948. pp. 59–60. **3012**

The death of 500 of 2,200 ram lambs is described following dipping after shearing in 0·1 % D.D.T. The chief lesion was an oedematous haemorrhagic swelling of a leg. The organism responsible was not definitely incriminated, but was probably a member of the clostridial group. —D. F. STEWART.

GILLMAN, T., & CHAIKOFF, I. L. (1949.) **Pathogenesis of experimental hepatic fibrosis and cirrhosis in the dog.**—*Arch. Path.* **48.** 67–84. [Authors' summary copied *verbatim.*] **3013**

Three pathogenetically distinct forms of connective tissue hyperplasia or hepatic fibrosis have been induced experimentally in dogs : (1) centro-lobular or peri-hepatic vein fibrosis ; (2) periportal fibrosis ; (3) diffuse interstitial or intralobular fibrosis.

The final pathologic pictures observed following the development of the three forms of fibrosis may be similar. The end picture of each is determined not only by the site of initiation of the fibrosis but also by the extent to which the liver is affected, the speed of development of the initial lesion and the degree to which the first type of fibrosis is complicated with focal necrosis, lobar or lobular hypertrophy or atrophy, and the supervention of additional forms of fibrosis.

While fibrosis, especially the centrolobular type, was frequently associated with severe fatty change of the hepatic epithelium or occasionally with central hemorrhagic necrosis, nevertheless it was also seen without being obviously related to hepatocellular damage.

Factors other than extensive degeneration or destruction of hepatic epithelium may play a critical role in determining the site of onset of hepatic fibrosis. Attention is drawn to the possible role of circulatory changes in the genesis

of hepatic fibrosis. The relative independence in reactivity of the parenchymal cells and the supporting tissue of the liver is indicated.

Different forms of fibrosis can occur in animals treated in an identical fashion, and even in different parts of a single liver. No correlation could be established between the type of fibrosis or the terminal cirrhosis and the experimental procedure used to induce the hepatic changes.

HÜLPHERS, G., & LILLEENGEN, K. (1948.) Gikt hos vilt levande fåglar. [**Gout in wild birds.**] —*Svensk VetTidskr.* **53.** 111–125. [English summary slightly amended.] **3014**

Among the material for game birds examined at the Department of Bacteriology and Hygiene at the Royal Veterinary College, gout was diagnosed in 22 capercailzie, 7 blackcock, 6 partridges, 1 hazel-grouse, 6 pheasants and 1 mallard.

Visceral gout appeared to be the most frequent form in the wild birds. Only 1 case of articular gout was diagnosed, in a blackcock. In visceral gout the changes were chiefly localized in the kidneys and the serous membrane of the liver and the heart. The kidneys, in particular, were the seat of the changes. They were in most cases enlarged, of a lighter colour than normal and contained deposits of silvery foci and fine streaks of urates. Precipitation of urates was also observed on the surface of the kidneys. The changes in the serous membranes were in most cases manifested as thin grayish-white coatings. In more advanced cases the coatings were thicker and of a plaster-like appearance.

In the case of articular gout plaster-like masses were observed in the joints of the knee and the tarsus.

ANDREWS, W. H. H., & MAEGRAITH, B. G. (1948.) **The pathogenesis of the liver lesion due to the administration of carbon tetrachloride.**—*Ann. trop. Med. Parasit.* **42.** 95–100. **3015**

The liver lesions produced in rats by the subcutaneous injection of 0·1 ml. per 100 g. body weight of carbon tetrachloride or chloroform are described, and a mechanism is indicated by which the changes are brought about.

The first microscopic change was noted six hours after the injection when parenchymal cells throughout the lobule were swollen. After 24–72 hours the central cells were degenerated and necrotic and there were occasional haemorrhages in this area. In mid-zone there was indicated hydropic necrosis of the parenchymal cells and the swollen cells obliterated the sinusoids. In species other than the rat the more peripheral cells were also hydropic at this stage. After the third day recovery commenced by a zone of regenerating cells preceded by large mononuclear cells moving towards the central vein. After a week the liver structure had returned to normal.

The authors consider that the carbon tetrachloride causes a swelling of the parenchymal cells and a consequent narrowing of the sinusoids. The resulting obstruction of blood flow towards the centre of the lobule produces an anoxaemia there followed by necrosis of the central cells. Sections of liver from both normal and dosed rats injected with indian ink demonstrate this narrowing of the sinusoids.—E. J. H. FORD.

See also absts. **3027** (cardiac syncope); **2969-2978** (anaemia); **3072** (dropsy in piglets); **3090** (insurance of animals).

POISONS AND POISONING

BRAY, K. S. F. (1945.) **Nitrite poisoning.**—*Yearb. Inst. Insp. Stk N.S.W.* 1945. pp. 39–41. **3016**

Of a mob of 5,000 sheep some 500 died after being unloaded from trucks. The sheep were infested with a variety of nematodes, but it was considered that the ingestion of weeds such as capeweed (*Cryptostemma* spp.) with consequent nitrite poisoning was chiefly responsible for the deaths.—D. F. STEWART.

WILKINS, J. H. (1948.) **A note on the toxicity of zinc chloride.**—*Vet. Rec.* **60.** 81–84. [Author's summary copied *verbatim*.] **3017**

An unsuccessful attempt was made to induce a chronic type of zinc poisoning in two sheep, two goats, a calf and a cow, by feeding them exclusively for a period of over five months on forage contaminated with zinc chloride solutions and "smoke." The "smoke" was produced by burning hexachlorethane smoke composition as used in standard Service smoke generators which produces over 50 per cent. zinc chloride as an end product.

No adverse clinical signs nor symptoms were manifested and no pathological lesions were shown on *post-mortem* examination. The carcases were normal and passed fit for human consumption. The calf is today (January, 1948) a normal healthy beast.

Rats could tolerate the daily intake of up to 120 mg. zinc chloride in their food over a period of 15 months. Those taking in 600 mg. zinc chloride daily, however, succumbed quickly showing characteristic symptoms and *post-mortem* lesions. The main effect seen was the corrosive action on the intestines and a characteristic damage to the kidneys due perhaps to the cumulative action of zinc.

SCHWARTE, L. H. (1947.) **The toxicity of sodium monofluoracetate (1080) for swine and chickens.**—*J. Amer. vet. med. Ass.* **111.** 301–303. **3018**

The relative toxicity of the rodent poison "1080" (sodium monofluoracetate) was determined for pigs and poultry because they are more likely to consume poisoned bait accidentally than strictly herbivorous animals.

Pigs of 50–150 lb. were given the poison, as a water solution, directly by stomach tube. All the animals died on doses ranging from 1 mg. per kg. (in 20 hours) to 30 mg. per kg. (in 55 min.). Pigs appear particularly susceptible as the minimum lethal dose is much less than that for the common Norway rat at 5 mg. per kg. or the horse at 5 mg. per kg. [see FRICK, E. J., & BROEBEL, F. W., *V. B.* **17.** 338.] Pigs first appeared restless and hypersensitive with nausea and vomiting at one-half to two hours; followed by convulsions, spasms and coma or symptoms resembling those of strychnine poisoning leading to death. On P.M. examination, haemorrhages on the heart, cardiac degeneration and a tar-like colour of the blood were found.

White Leghorn chickens, weighing 1–2·35 kg., were given the compound directly into the crop. Toxic symptoms arose with as little as 5 mg. of sodium monofluoracetate, the minimum lethal dose being about 14 mg. per kg. Four birds which received sublethal doses were given similar doses 48 hours after the initial dose and all died within 48 hours. Restlessness followed the administration, with blanching of the comb and wattles. Higher doses produced congestion and cyanosis and the birds became progressively weaker, but few developed nervous symptoms or convulsions prior to death. The P.M. changes were more severe than those in pigs.—MALCOLM WOODBINE.

RICHART, M. (1947.) Empoisonnement du bétail par les arsenicaux employés comme insecticides dans l'agriculture et l'horticulture. **[Poisoning of stock by arsenical insecticides.]**—*Encyclopéd. vét. période.* **4.** 223–228. **3019**

Numerous cases of poisoning are cited in all classes of stock which had been in contact with arsenical insecticides. The affected stock had either been pastured in fields adjoining sprayed crops or in an orchard which had been sprayed; or had drunk water which had been in contact with containers used for transportation of the insecticide.—J. R. PICKFORD.

GROVES, K., MCCULLOCH, E. C., & ST. JOHN, J. L. (1946.) **Relative toxicity to swine of lead arsenate spray residue, lead arsenate, lead acetate, and arsenic trioxide.**—*J. agric. Res.* **73.** 159–166. **3020**

A study was made to find whether unwashed apples which had been sprayed with lead and arsenic sprays as a routine measure against plant diseases, could be fed safely to pigs and whether the meat of animals fed such apples would contain significant amounts of lead and arsenic. [Since no time is stated presumably the spraying was done shortly before the apples were given to the pigs.]

Six pigs were used; one was given peelings of sprayed apples *ad lib.*, three others were given respectively an equivalent amount of lead arsenate, or lead as lead acetate, or arsenic as arsenic trioxide; the fifth pig received a quarter of the amount of sprayed residue given to the first pig, whilst the sixth was fed a normal diet.

The trials extended over a period of 103 days, a resting period of three months and a period of 180 days. The pig fed sprayed apples consumed 114·8 g. of lead arsenate. Weight gain was approximately equal to that of the control. No abnormalities were found on examination of blood samples from the pigs. The pig receiving lead acetate died on the 104th day of the experiment, but no P.M. examination was made. When the other five were killed, the intestinal contents, the liver, heart, spleen, blood and bones were examined for the amount of lead and of arsenic present. Of the edible portions of pigs one and two which had received large amounts of lead arsenate only the livers contained more lead than 7·14 p.p.m., the limit set by the Food and Drug Administration of the Federal Security Agency for spray residues on apples and pears, and none of the organs analysed contained more than the limit of 3·57 p.p.m. set for arsenic trioxide.

The authors concluded that lead arsenate spray residues were less toxic to pigs than was generally supposed.—J. A. J. VENN.

MARK, J. H. (1947.) **Thallium poisoning in dogs.**—*Vet. Ext. Quart. Univ. Pa.* **47.** 71–73. **3021**

In 13 cases the acute signs were severe vomiting, diarrhoea, respiratory distress, abdominal pain, inappetence, thirst, temperatures up to 102·5°F. and death in 3–5 days. Chronic signs were less severe with a characteristic rapid depilation, eczema-like lesions and death in 7–12 days. Treatment involved gastric lavage and emetics or, if sick for more than 24 hours, parenteral glucose, gastric sedatives, atropine and oxygen. B.A.L. had no effect. Diagnosis was, and should always be, confirmed spectrographically.—MALCOLM WOODBINE.

FRICK, E. J., & FORTENBERRY, J. D. (1948.) **Equine antu poisoning.**—*Vet. Med.* **43.** 107–108. **3022**

A horse given *per os* 26 mg. per kg. body

weight of the rat poison antu (alpha-naphthylthiourea) died the same night; a second horse was given at first 11 mg. per kg., increasing to 15 mg. per kg., 23 mg. per kg., 30 mg. per kg., 40 mg. per kg. during the next twelve days to a dose of 60 mg. per kg. The last dose produced some symptoms for the first time, but not until the dose was raised to 80 mg. per kg. were lethal symptoms observed. In both cases there was fluid in the pleural cavity, together with congestion and oedema of the lungs and catarrhal gastro-enteritis.—R. MARSHALL.

FAIRFAX, R. E. (1948.) **Carbon tetrachloride poisoning of sheep.**—*Yearb. Inst. Insp. Stk N.S.W.* 1948. p. 73. **3023**

The administration of carbon tetrachloride produced poisoning in a mob of 100 lambing ewes, of which 15 died. All except one of the remaining affected sheep recovered following the injection of 50 ml. of 20% calcium borogluconate. The ewes had been taken off natural pasture into a paddock containing trefoil, rye grass and oats, 20 hours prior to drenching. A similar mob which had remained on natural pasture were unaffected by the carbon tetrachloride.—D. F. STEWART.

COLLET, P., & THÉOLEYRE, P. (1947.) Essais sur la toxicité de l'hexachlorocyclohexane chez les carnivores domestiques. **[Toxicity of benzene hexachloride for carnivora.]**—*Bull. Soc. Sci. vet. Lyon.* **49.** 128–133. **3024**

The authors give a general consideration to the literature on the use of benzene hexachloride as a parasiticide. There is no new material.

—W. R. BETT.

SHAW, J. N., & MUTH, O. H. (1949.) **Some types of forage poisoning in Oregon cattle and sheep. [Rye grass.]**—*J. Amer. vet. med. Ass.* **114.** 315–317. **3025**

Rye grass poisoning was suspected in stock grazing on perennial rye grass stubble in an area where crops were grown for seed production. The affected animals had marked symptoms of a nervous disorder, in some cases followed by death, but in others the animals recovered on removal from the pasture. Similar cases of varying severity occurred in animals fed pea silage or screenings from fescue seeds. Investigations failed to find the cause of the poisoning by grazing on rye grass stubble. In the case of the pea silage it was thought to be due to black nightshade (*Solanum nigrum*) in the ensiled crop, and in the case of the fescue to infestation with nematodes (*Anguina agrotis*).—J. R. PICKFORD.

SANDERS, D. A. (1946.) **Lantana poisoning in cattle.**—*J. Amer. vet. med. Ass.* **109.** 139–141. **3026**

See also absts; **3015** (carbon tetrachloride); **3033-3034** (penicillin).

Lantana camara, a shrub belonging to the family *Verbenaceae*, commonly occurring in the Southern States of America, especially where it has gone wild from centres of cultivation, causes severe chronic sensitivity of the skin to light in cows when an amount as small as three-quarters of a lb. is eaten. There is irritation of the gastro-intestinal tract. Acute enteritis with death within a few days may occur.

The sensitization results in the formation of hard, cracked, discoloured areas of skin, especially in non-pigmented regions, the muzzle, nostrils and eyes being particularly affected.

—R. MARSHALL.

SCHIEREN, J. (1946.) Solaninvergiftung und enzootischer Herztod der Schweine. **[Solanine poisoning and cardiac syncope in pigs.]**—*Berl. Münch. tierärztl. Wschr.* No. 5. pp. 50–53. **3027**

Pigs fed solanin-containing materials, *e.g.* potato shoots and haulms, green undeveloped potatoes, potato berries and purified solanin, had no symptoms of cardiac syncope; one pig given 5 g. of solanin with syrup and wheat bran developed intestinal disturbance but no characteristic symptons of cardiac syncope.—R. MARSHALL.

SAEUBERLICH, G. (1946.) Über Solaninvergiftung bei Geflügel. **[Solanine poisoning in fowls.]**—*Berl. Münch. tierärztl. Wschr.* No. 8. pp. 25–27. **3028**

Feeding poultry with solanin-containing materials, *e.g.* cooked potato shoots, green potatoes, potato foliage, potato berries and pure solanin, caused no symptoms of ill-health.

—R. MARSHALL.

CURASSON, G. (1941.) Intoxication directe ou indirecte par les cantharides, chez l'homme et les animaux. **[Cantharides poisoning in man and animals.]**—*Bull. Serv. zootech. Epiz. A.O.F.* **4.** 191–192. **3029**

Cantharides poisoning in animals in western Africa is not rare. Poisoning of cattle by water containing drowned *Cantharis* flies is important and similar accidents could occur in man. The case is reported of a man who after eating frogs for supper developed during the night extreme thirst, gastric pain, frequent blood-stained micturition and priapism. A frog was given for four days 0·5 ml., 1 ml., 1·5 ml., and 2 ml. tincture of cantharides, without indication of toxic signs. On the fifth day its muscles were fed to two g. pigs, which developed nephritis and cystitis and died. C. concluded that a safe precaution would be to avoid eating Sudanese frogs during the season (late winter) when drowned cantharides are abundant in ponds and water holes.—W. R. BETT.

PHARMACOLOGY AND GENERAL THERAPEUTICS
(For treatment of specific infections see under the appropriate disease)

CHARY, R. (1948.) Essais comparatifs sur la circulation des sulfamides chez le cheval (sulfapyridine et sulfathiazol). [**Circulation of sulphonamides in the horse (sulphapyridine and sulphathiazole).**]—*Rev. vét. milit.* **3.** 290–306. **3030**

This report describes experiments on the administration of sulphapyridine or sulphathiazole to 20 horses with various infections. Some 10–30% was unabsorbed when given *per os*. This residual drug may upset the herbivorous digestive function by interference with the symbiotic gastro-intestinal flora. Single doses *per os* of 0·017–0·2 g. per kg. give maximum blood levels at 1–3 hours decreasing to zero at 24–30 hours. A similar course follows intravenous administration of doses of 0·017 –0·1 g. per kg. In all cases sulphapyridine gave higher levels than sulphathiazole. Three to four doses a day totalling 0·2–0·3 g. per kg. are necessary to maintain blood levels of over 5 mg. %. Using similar dose per kg. weight ratios the horse blood level is greater than that of the bovine, cat, dog, sheep or pig.

—M. WOODBINE.

WELSH, M., LANGER, P. H., BURKHART, R. L., SCHROEDER, C. R., & POPPENSIEK, G. C. (1948.) **Sulfonamide blood concentrations in foxes.**—*Vet. Med.* **43.** 522–524. **3031**

Five normal foxes were subjected to a series of four experiments, the same animals being used throughout with rest periods of at least one week between each trial. Blood concentrations were determined at four-hourly intervals following oral administration of a single dose of 0·5 gr. per lb. body weight of sulphamethazine, sulphadiazine, sulphamerazine, sulphathiazole, sulphapyridine, sulphaguanidine or sulphanilamide.

Although sulphanilamide reached a peak more promptly, sulphamethazine maintained the highest concentrations (almost 6 mg. per 100 ml. of blood) throughout. Sulphamethazine alone was then used in the remaining tests. When it was given subcutaneously at a dosage of 1·5 gr. per lb. body weight on the first day, and of 1 gr. per lb. on the second and third days, effective blood concentrations were maintained throughout. At a concentration of 1 : 500 in the drinking water, the solution was so unpalatable that insufficient was taken to provide blood concentrations of required amounts. Following a single rectal administration of 1 gr. per lb. body weight, in a 10% solution, the drug was rapidly absorbed, and the blood concentration was still adequate after 12 hours. None of the dosages produced any signs of systemic toxicity.—G. P. MARSHALL.

GRUNBERG, E., & SCHNITZER, R. J. (1949.) **An experimental study on the influence of different vehicles on the generalized and topical effect of penicillin G.**—*Yale J. Biol. Med.* **21.** 377–384. [Authors' summary copied *verbatim*.] **3032**

In streptococcal experiments, no difference could be observed between oily suspensions and aqueous solutions of penicillin in a systemic therapeutic infection of mice. Non-aqueous vehicles such as oil and oil plus beeswax (Romansky mixture) prolonged the prophylactic effect of penicillin G in the generalized infection and increased its topical activity as compared with aqueous vehicles. In addition, it was much more difficult to achieve an in vivo artificial interruption of penicillin suspended in oil by hydroxylamine hydrochloride than had been observed with aqueous solutions.

These results seem to indicate that not only is there a delay in absorption due to the oil, but they also suggest an increased stability of penicillin which is due to the protection by an oil coating of the surface of the particles.

MIESCHER, G., & BÖHM, C. (1947.) Zur Toxikologie des Penicillins. [**On the toxicology of penicillin.**]—*Schweiz. med. Wschr.* **77.** 821–826. [Abst. in *Bull. Hyg., Lond.* **22.** 789. (1947), copied *verbatim*. Signed: L. P. GARROD.] **3033**

It is well recognized that guineapigs tolerate only much smaller doses of penicillin than other animals. By administering varying doses by different routes, these authors have shown that the toxicity of penicillin for guineapigs is from 100 to 1,000 times greater than that for mice. This effect is not due to impurities. The principal lesion usually found is haemorrhage and necrosis in the adrenals. Some rather irregular protective effect was obtained by giving "Percorten" [presumably a cortical adrenal extract]. Tolerance could not be enhanced by giving a series of initially small increasing doses.

Other experiments are described which appear to indicate that a toxic substance is formed at the site of injection. Penicillin was applied as a solid to the scarified skin of guineapigs or injected intramuscularly. These skin areas were removed and extracted after 12, 24, or 48 hours. The 48-hour extracts were toxic to other guineapigs, causing not only adrenal lesions but liver necrosis and other changes. They contained no penicillin, and were not toxic to mice. Similar tissue extracts prepared after penicillin injection in rabbits proved toxic to guineapigs in only one instance out of 14. In almost all these experi-

ments, guineapigs showed a wide range of individual susceptibility.

WALKER, A. E. (1947.) **Toxic effects of intrathecal administration of penicillin.** — *Arch. Neurol. Psychiat., Lond.* **58.** 39–45. [Abst. in *Bull. Hyg., Lond.* **23.** 280. (1948), copied *verbatim.*] **3034**

Two cases illustrating types of neural reaction to intrathecal administration of penicillin—radiculitis and myelopathy associated with chronic leptomeningeal thickening—are presented. Such reactions usually occur only when large amounts of penicillin are injected into the subarachnoid space. When moderate or small doses of the drug are used, the complication is rarely encountered.

JAWETZ, E., & COLEMAN, V. R. (1949.) **Laboratory and clinical observations on aerosporin. (Polymyxin B.)**—*J. Lab. clin. Med.* **34.** 751–760. [Authors' summary copied *verbatim.*] **3035**

Aerosporin brand Polymyxin B is a stable peptide derived from *B. polymyxa* with marked anti-bacterial action against many gram-negative organisms. Among bacteria commonly isolated from urinary tract infections, *Esch. coli* and *A. aerogenes* were inhibited in vitro by less than 1 μg per milliliter, while many strains of Proteus and Pseudomonas were more resistant. Resistance could be induced in susceptible bacterial strains only with difficulty. The action of the antibiotic in vitro appeared to be bactericidal rather than bacteriostatic. Multiple intramuscular injections of the drug resulted in cumulative serum levels. The serum levels were greatly increased in the presence of elevated nonprotein nitrogen of the blood. In patients with chronic urinary tract infection, Polymyxin B administered for three to four days eliminated susceptible bacteria from the urine and controlled symptoms. The short course of treatment, however, was followed by a bacteriologic relapse within one to three weeks in all cases. Prolonged therapy with the drug was not feasible because of toxic symptoms affecting particularly the nervous system. In its present form, Polymyxin B is therefore not suitable for general clinical application.

CRASQUIN, R. (1946.) Contribution à l'étude de l'histamine et des antihistaminiques dans la pathologie et la thérapeutique médicales vétérinaires. [**Histamine and antihistamines in veterinary pathology and therapeutics.**]—*Thesis, Alfort.* pp. 77. **3036**

C. gives a brief review of the action and formation of histamine in the animal body, and records cases in which the administration of the synthetic antihistamine "antergan" given intravenously in 10–20 ml. [animal not stated: most of work described by author refers to horses] doses has proved of value. A single dose should not exceed 20 ml. but it may be given up to a total of 100–150 ml. if necessary. The use of the drug is indicated in congestive states such as laminitis, pulmonary, cerebral or intestinal congestion and in myoglobinuria in horses and in urticaria in cattle. In all such conditions there is an abnormally large amount of histamine in the blood stream, the normal histamine content of horse blood being about 10 μg. per l. It is pointed out that antihistamine treatment only relieves the immediate symptoms and does not influence the underlying cause.—J. A. NICHOLSON.

LANDAHL, H. D., & HERMANN, R. G. (1948.) **On the retention of air-borne particulates in the human lung.**—*J. industr. Hyg.* **330.** 181–188. [Abst. in *Bull. Hyg., Lond.* **23.** 861. (1948), copied *verbatim.* Signed: C. N. DAVIES.] **3037**

This paper describes the extension of the work of LANDAHL and BLACK on nasal filtration to the removal of particles by the lungs. A similar technique was used, with cascade impactors for sampling, but the impactors had to be backed with impingers and filters to collect the finer particles which were not important in the nasal problem.

The retention of stable, non-hygroscopic particles of corn oil (density 0·91) was found to be as follows:

Particle diameter	...	1	2	3	5 microns
Per cent. retention in lung (mouth breathing)	...	23	38	52	68

According to these figures the retention in the lung is substantially less than has been suggested in previous estimates. It would be worth while checking these results, as an overestimate in particle size, which can easily occur, could account for the discrepancy.

Particles of high density are retained to a greater extent, roughly in proportion to their density; hygroscopic particles absorb water to form drops which are larger and are more effectively retained than the original particles would have been.

Retention is enhanced by slow, deep breathing. It also rises when the inspired air flow is increased but the respiration frequency is held constant.

See also absts. **2843-2848** (mastitis); **2853** (equine streptococcal erysipelas); **2859** and **2862-2869** (TB.); **2877** (streptomycin); **2879** (swine dysentery); **2895** (actinomycosis); **2901** (leptospirosis); **2909-2912** (trypanosoma infections); **2916** and **2919** (trichomonas infection); **2921** and **2923** (coccidiosis); **2927** (small pox); **2980** (trichostrongylus); **2982** (roundworm); **2989** (leucaemia); **3002** (rickettsia in swine); **3007** (milk fever); **3036** (antibiotics); **3066-3068** (stilboestrol); **3073** (foal septicaemia); **3082** (textbook); **3088** (metallic salts in veterinary medicine).

PHYSIOLOGY, ANATOMY AND BIOCHEMISTRY

BRUNT, D. (1947.) **Some physical aspects of the heat balance of the human body.**—*Proc. R. phys. Soc. Lond.* **59.** 713–726. [Abst. from author's summary in *Trop. Dis. Bull.* **45.** 648. (1948), copied *verbatim.* Signed: T. BEDFORD.] 3038

The combined convective and evaporative heat losses from the body are proportional to the difference between the total heat content of air saturated at the mean skin temperature, and the total heat content of the ambient air. The upper limit of temperature and humidity for the nude man is given in terms of the temperature of radiating surfaces, the total heat content of the air and the air velocity. This equation requires that the mean skin temperature is known, but it is said that there are available sufficient observations to enable a reasonably accurate figure for that skin temperature to be estimated for given rates of physical effort. Experimental data are given.

KELLY, C. F., HEITMAN, H., Jr., & MORRIS, J. R. (1948.) **Effect of environment on heat loss from swine.**—*Agric. Engng.* **29.** 525–529. [Abst. from abst. in *Nutr. Abstr. Rev.* **18.** 807. (1949). Signed: J. W. HOWIE.] 3039

A chamber 9 × 14 × 7 ft. high was built, in which environmental temperature, air flow, and relative humidity could be controlled. The chamber was neither a calorimeter nor a respiration chamber; these may be developed at a later stage of the work, but it was equipped with suitable instruments for making accurate measurements and recordings of the heat lost by pigs through radiation, conduction, and convection at environmental temperatures between 40° and 100°F. The tests always began at 70°F. Then the temperature was raised to whatever was required above 70° and kept there for 1 week, after which recordings were made. The temperature was then brought back to 70°F. and the animals were rested before the temperature was lowered in turn to 60°, 50°, and 40°F., one week at each temperature, for further measurements of heat loss. Relative humidity was kept at as nearly 50 per cent. as possible and air motion was kept low at 20 to 30 ft. per min. The air was changed 1 to 1½ times a minute.

The authors describe instruments and methods rather than results, but some of these are mentioned. At 60°F. and lower temperatures the 4 pigs in the chamber formed a close huddle and so reduced the heat-losing surface, and also raised the temperature of the air above themselves. At 40°F. the animals were so restless that they did not lie still long enough for some of the instruments to reach equilibrium and permit of readings being made.

Numerous formulae are given in the paper for calculating actual heat losses of different kinds from pigs of different weights and sizes.

SPERLING, F., & KOPPANYI, T. (1949.) **Histophysiologic studies on sweating.**—*Amer. J. Anat.* **84.** 335–363. [Authors' summary copied *verbatim.*] 3040

In cats, heat-sweating occurs only when the body temperature reaches a critical level (40–41°C.). This is accompanied by hyperpnea and salivation. Suppression of perspiration and salivation by atropine or antidiaphoresis by agaric acid results, during exposure to heat, in still higher body temperatures and is usually followed by death (cats and rabbits). Active sweat glands of cats (glomeruli as well as the proximal portions of the ducts) prevent neutral leuco methylene blue from turning blue in the presence of molecular oxygen, while inactive tissues become stained. This procedure may be considered as a qualitative test of function of the sweating apparatus. The adnexa of the sweat glands, fibrillar bodies (myoepithelial elements), shrink during sweating and expand again during anhidrosis. This volume decrease appears to be due to loss of water which may contribute to the initial outflow of sweat. During sweating, the portion of the duct in the stratum corneum changes from a tight spiral to a loosely convoluted tube. The presence of ampullae in this portion of the duct at irregularly spaced intervals suggests that the outflow of sweat proceeds in a succession of droplets.

The mucous glands in the skin of frogs exhibit the same reactivity to specific pharmacological agents as the sweating apparatus of mammals. Atropine and agaric acid inhibit mucous secretion upon systemic, and aluminium chloride upon local, administration.

FOLLEY, S. J., & FRENCH, T. H. (1949.) **Acetate as a possible precursor of ruminant milk fat, particularly the short-chain fatty acids. [Correspondence.]** — *Nature, Lond.* **163.** 174–175. 3041

Lactating mammary gland slices of non-ruminants (rat, mouse, rabbit and g. pig) gave a high respiratory quotient in the presence of glucose, indicating the probable formation of fat from carbohydrates; on the other hand, the respiratory quotient of goat and cow slices was below unity. With acetate as substrate the situation was reversed. The mammary tissue of the ruminant is thus adaptable for acetate metabolism, not only oxidizing it but probably utilizing it for fat synthesis, and differing in this respect from other mammals, such as the rat, which appears to require carbohydrate as a substrate for fat forma-

tion. These results are consistent with the theory that part of the ruminant milk fat is synthesized from acetate and, if so, it is likely that the short-chain fatty acids arise in this way.

—M. Woodbine.

Protasenya, T. P. (1946.) **[Mechanism of evacuation of stomach and intestinal contents in horses.]**—*Veterinariya, Moscow.* No. 1. pp. 32–34. **3042**

The study of the ingestion of food, of peristalsis and digestion, and the action of different types of fodder, drugs and water on various sections of the alimentary canal was elaborated by P. in the course of 11 years' work using artificial fistulae. Four of the best methods evolved for forming the various abdominal fistulae were: (1) an incision along the lower half of the 12th rib for the approach to the ventral portion of the stomach; (2) alongside the 18th rib through the right flank for approach to the duodenum; (3) an incision through the right subcostal region, a finger's breadth away from the costal cartilages, which gives access to the colon; (4) an incision through the lower right flank for approach to the head of the caecum.

Descriptions are given of the movements in the stomach and intestines and the intervals at which food and water pass along, as observed visually.

P. disagrees with Ellenberger & Scheinert, stating that the ingestion of food does cause accelerated peristalsis from the *pars glandularis.* He also found that reverse peristaltic movements of the duodenum occur periodically, the pylorus opening and bile entering the stomach.—F. A. A.

Stone, E. C. (1949.) **Fermentation ability of ingesta from normal and atonic bovine rumens.**—*Amer. J. vet. Res.* **10.** 26–29. **3043**

A comparison of the volatile fatty acid content and the amount of gas produced during fermentation was made with ruminal contents taken from normal cows and from cows with ruminal atony as the result of the presence of a foreign body. It was found that the volatile acidity of ingesta from an atonic rumen and the ability of the ingesta to produce gas are appreciably less than with ingesta taken from a normal rumen. Atony of the rumen could not be produced by the use of drugs such as atropine or histamine.—J. A. N.

Thomas, L., & Stetson, C. A. (1949.) **Studies on the mechanism of the Shwartzman phenomenon.**—*J. exp. Med.* **89.** 461–478. [Authors' summary copied *verbatim.*] **3044**

Rabbit skin which is prepared for the Shwartzman phenomenon by an intradermal injection of meningococcal toxin exhibits, *in vitro,* a high degree of aerobic glycolysis. This metabolic abnormality is reflected, *in vivo,* by a measurable increase in the concentration of lactic acid in the prepared skin. Some increase in anaerobic glycolysis also occurs in prepared skin; this is of less degree than the increase in aerobic glycolysis. The respiratory quotient of prepared skin tends to be somewhat higher than that of normal skin, although the oxygen uptake is not significantly altered.

Gross hemorrhagic lesions which resemble the Shwartzman phenomenon are produced by the intradermal injection of papain into rabbits which have received an intravenous injection of meningococcal toxin one hour previously. Such hemorrhagic reactions are not observed when papain is injected into normal rabbit skin.

Similarly, hemorrhagic lesions are produced by the intradermal injection of cysteine and BAL, following an intravenous injection of meningococcal toxin.

An hypothesis to explain the Shwartzman phenomenon, which implicates tissue protease in the damage to the blood vessels of the skin, is proposed.

Schilling, F. J., & De Natale, A. (1949.) **Naturally-occurring anticoagulants and accelerator substance in human blood.**—*Amer. J. med. Sci.* **218.** 70–75. [Authors' summary copied *verbatim.*] **3045**

A review of the literature on naturally-occurring heparin-like substances is presented. The action of heparin upon the prothrombin time is illustrated and compared with the effect of dicumarol on the prothrombin mechanism. From the whole and dilute prothrombin determinations there is devised a simple plan for adequate regulation of heparin and dicumarol during the initial combined anticoagulant treatment of thromboembolic diseases. The presence of naturally-occurring hypercoagulable (accelerator) and anticoagulant-like substances is illustrated with cases cited. The prothrombin mechanism in relation to thromboembolic diseases, particularly myocardial infarction, is investigated and evaluated.

Case, R. A. M. (1946.) **Siderocytes in mammalian blood.**—*Proc. roy. Soc.* Ser. B. **133.** 235–248. [Author's summary slightly modified.] **3046**

Since a review of the conditions under which siderocytes appear will support a hypothesis that they are ageing erythrocytes at least as strongly as Grüneberg's (1941) theory that they should be considered as young cells, a search was made in blood films of stored mammalian blood and large numbers of siderocytes were found.

The conditions affecting the rate of appearance of the siderocytes were studied, and it was

found that adverse conditions would hasten their appearance.

The relationship of the siderotic material to the " easily split " blood iron was also considered, and it seems probable that both are derived from a special and identical fraction of " haemoglobin ", and that this phenomenon is related to an intracorpuscular bile pigment formation.

The occurrence of siderocytosis after the ingestion of acetyl phenylhydrazine by a " normal " human being was followed, and a close correlation between siderocytosis, erythrocyte destruction and urinary siderosis as described by Peyton Rous (1918) is shown.

The siderocyte extrudes its siderotic granules and reverts to a state at present morphologically indistinguishable from the normal erythrocyte, but appears to be susceptible of phagocytosis at this stage.

The application of siderocyte counts to clinical medicine is suggested.

EDERSTROM, H. E. (1949.) **Comparison of RBC counts in central and peripheral blood in various laboratory animals.**—*Proc. Soc. exp. Biol., N.Y.* **70.** 172–173. **3047**

It has been reported that red cell counts of blood from the tail of the rat are higher than counts of blood from the larger vessels. In order to determine the correctness of this report, counts were made with peripheral blood taken from the tail or ear and one hour later with blood taken from the great vessels in the neck after decapitation or directly from the heart. Slight differences were observed in the rat, mouse and hamster, but none in the rabbit, g. pig and dog. Statistical analyses indicated that even in the first three species mentioned, a significant difference could not be said to exist.—J. A. NICHOLSON.

EL HINDAWY, M. R. (1948.) **Studies on the blood of dogs. I. The blood picture in normal dogs.**—*Vet. J.* **104.** 49–63. **3048**

A study was made in Egypt on the blood of 74 normal stray dogs of different ages, breeds and sexes. Detailed results of experimental work are listed and discussed, comparisons being made with the findings of other authors. Red blood cells increased in number from an average of 4 million per c.mm. in puppies to 4·5 in adolescents, and to 5·4 and 5·6 in adult males and adult females respectively. The haemoglobin concentration per 100 ml. of blood was 8·7 g. in puppies, 8·5 g. in young dogs and 9·8 g. in adults. The mean values of the total leucocyte count were 8,123 in puppies; 10,446 in young dogs and 12,762 in adult dogs. No significant difference in leucocyte counts was found to exist between males and females.

The platelet count was very variable in different individuals and even in the same individual.—J. A. J. VENN.

CONIGLIO, J. G. (1947.) **Changes in plasma inorganic phosphorus of dogs under postural restraint.**—*Proc. Soc. exp. Biol., N.Y.* **66.** 534–537. **3049**

Changes in levels of inorganic phosphorus were noted in the blood of dogs restrained on their backs for periods of from 30–240 min. Samples for analyses were drawn from the femoral vein, cooled, centrifuged and the plasma was analysed by the method of Lowry and Lopez using the ice-cold trichloracetic acid filtrate of the plasma. The amount was estimated colorimetrically.

Marked decreases in plasma inorganic phosphorus, averaging 52% of the initial level, were obtained in all but one of 17 experiments on four dogs. The decrease in inorganic phosphate was accompanied by an increase in plasma glucose. In dogs restrained on their backs there was a greater decrease than in those restrained in a stock.—ARTHUR W. MARRABLE.

MALTANER, F. (1948.) **Enhancing effect of Mg^{++} on clotting activity of Ca^{++}.**—*Proc. Soc. exp. Biol., N.Y.* **67.** 301–303. [Author's conclusions copied *verbatim*.] **3050**

The results of the experiments demonstrated that whereas ionized magnesium salts ($MgCl_2$) alone do not possess the coagulative activity of calcium salts, they do markedly enhance the effect of calcium. The enhancement is more apparent when the Ca ion concentration is relatively low and the concentration of magnesium salts exceeds that of calcium salts. Thus the action of Mg^{++} is secondary or accessory, the more essential and decisive role in clotting being played by Ca^{++}.

The parallelism between the enhancing effect of Mg^{++} in the coagulative and the complementary activities of the blood provides additional support for the close relationship of these two phenomena.

GAUTIER, C. (1946.) Historique de la découverte des premiers stades de l'oeuf chez les mammifères. **[An account of the discovery of the mammalian ovum.]**—*Rev. Path. comp.* **46.** 332–342. **3051**

In this historical account of the discovery of the mammalian ovum G. refers in particular to the part played by the two Dutch biologists De Graaf and Swammerdam. He shows that the idea of the ovum was known prior to De Graaf's investigations, having been referred to previously by Stenton. De Graaf made no claim to be the discoverer of the ovarian follicles with which today his name is generally associated. All that he did was to study the follicle more seriously than other biologists before him, although it is noted

that in his publications there is some confusion between the ovum and the follicle. G. points out that the merit of De Graaf lies in the fact that he did see the fertilized rabbit ovum of a stage a little earlier than that of the morula, and that Swammerdam originated the term "ovary" instead of female testes. This interesting account is ended by reference to other accounts relevant to the discovery of the mammalian ovum (*e.g.*, von Baer, Négrier, Milne-Edwards, Balbiani, van Beneden, Béclard, Mathias Duval).

—F. R. Bell.

Johnstone, I. L. (1948.) **The growth and development of the penis in sheep: their possible relationship to posthitis.**—*Aust. vet. J.* **24.** 86–88. **3052**

During an investigation of "sheath rot" (ovine posthitis) certain features of the anatomy of the penis and prepuce of ram lambs and wethers were observed.

At birth, the glans penis and processus urethrae are completely enveloped in the mucous membrane of the prepuce, there being adhesion between the adjacent cell layers of the preputial mucosa and those of the penile structures. The urethral process lies in a groove on the wall of the prepuce. At the age at which castration is normally carried out (4–6 weeks), the adhesions to the mucosa have so broken down that about one-quarter inch of the urethral process can be seen embedded in the groove on the everted prepuce. The tip of the urethral process next becomes freed from the groove, the free portion gradually increasing in length. The adhesions over the glans penis resolve and the penis has the same form and freedom as in the adult ram.

The time required for the complete development of the penis varies, being seldom less than 15 weeks. It is under endocrine control, but appears to be affected by nutrition and the general state of growth. The rate of development of the penis does not necessarily correspond with the rate of growth of the horns, also under endocrine control.

Examination of the penis of adult wethers revealed that although the organ is small, the glans and urethral process are fully formed. A very similar condition exists to that described in ram lambs under 15 weeks of age. It appears that the freeing of the glans penis and processus urethrae is generally halted at the particular stage reached at the time of castration.

The observations showed that the investment of the penis by the preputial mucous membrane in wethers does not necessarily predispose to "sheath rot". Hence the postponement of castration until the lambs were some five months old would have no preventive value.—C. S. S.

Furlong, E., Krichesky, B., & Glass, S. J. (1949.) **Effect of carbon tetrachloride-feeding on estrogen excretion in the normal female guinea pig.**—*Endocrinology.* **45.** 1–9. [Authors' summary copied *verbatim.*] **3053**

By the use of the intravaginal assay method it is found the normal female guinea pig excretes $0{\cdot}035 \pm 0{\cdot}010$ mcg. estrone equivalents per day with a range from 0·023 to 0·049. When CCl_4 is fed, by the method and dosage described, the following changes in estrogen excretion occur (expressed as mcg. estrone equivalents): (1) During the first 50 days the level of estrogen excretion increases to a peak 350 times normal. (2) During the second 50 days, the excretion level decreases, a phenomenon not reported previously. (3) During the third 50 days, a fairly constant level of estrogen excretion is maintained at approximately 3·7 times normal. When the effects of extended CCl_4 feeding are allowed to regress for 45 days the levels of estrogen excretion return to normal. Resumption of CCl_4 administration results in an increase in estrogen excretion similar to that following initial CCl_4 feeding.

It is suggested that the sequence of effects of CCl_4 administration are (1) an impaired inactivation of estrogens resulting in increased excretion, followed by (2) either an inhibition in the production of endogenous estrogens, or, loss of activation of estrogens resulting in decreased estrogen excretion.

Tuba, J., Baker, D. B., & Cantor, M. M. (1949.) **The relationship of serum phosphatases to sex hormones.**—*Canad. J. Res.* Sect. E. **27.** 202–209. [Authors' abst. copied *verbatim.*] **3054**

Castration produces a fall in serum inorganic phosphorus values in adult male rats but not in female rats. The alterations of phosphorus levels that occur following castration in male rats and after the injection of some hormones into normal and castrated rats of both sexes may be accounted for by corresponding alterations in metabolic requirements. Neither castration nor hormone injection produces any significant change in serum acid phosphatase activity in male or in female rats. A fall of about 30% to levels approaching values for normal female rats is found in serum alkaline phosphatase of castrated male rats in about eight weeks. There is no change in the enzyme values in castrated females. In those instances where injections of a sex hormone into castrated or normal rats produce alterations in alkaline serum phosphatase values such changes may be accounted for on the basis of altered food intake. The sole exception to this finding is the very marked decrease in the activity of the enzyme produced by progesterone after oestrogen in normal male rats.

ALEXANDER, F., & DONALD, D. E. (1949.) **Caecostomy in the horse.**—*J. comp. Path.* **59.** 127–132. **3055**

The authors describe an operation for creating a permanent caecal fistula for physiological investigations. The first stage consisted of exteriorizing part of the caecal wall. Details of pre-operative treatment and restraint are given and also of the anaesthesia used. A series of incisions were made through skin, muscle layers and peritoneum following a line located similarly to that for bovine rumenotomy, but in the right flank. The resulting ring of peritoneum was sutured to the cut edge of the internal oblique muscle, using silk.

A portion of the lateral surface of the caecum, near its base, was then anchored to the peritoneal ring by interrupted silk sutures which included the caecal mucosa within their grasp. The caecum was then sutured to the lips of the skin wound, using linen, thus exteriorizing the caecal serosa.

After 5–6 days, when the edges of the wound were adherent, the caecum was opened, packed off, and the edges of the caecal aperture sutured to the skin with nylon. A special inflatable rubber stopper, similar to those used for rumenotomy, was inserted, inflated, and attached to the surcingle. A detailed description and two photographs of this stopper are given.

Between the two stages of operation a daily dressing of sterile vaseline on a gamgee pad was sutured in place. Considerable exudation and granulation occurred after both stages, and some oozing of bowel contents around the stopper caused minor surface infection, but the fistula was established in three weeks. No loss of condition occurred over several months after the fistula was created. There are three photographs illustrating the operation.—R. J. FITZPATRICK.

See also absts. **2926** (bovine haematology); **2981** (endoparasitic nervous disorders); **2993** (ovine alimentary tract and digestion); **2994** (loss of protein); **2998-2999** (mineral metabolism and lactation); **3003** (brain disturbances in chicken through lack of vitamin E); **3085** (proteins and amino acids); **3089** (equine angiology).

PUBLIC HEALTH, VETERINARY SERVICES AND VETERINARY EDUCATION

TROUT, G. M. (1945.) **Tracing the causes of off-flavours in milk: a guide.**—*Quart. Bull. Mich. agric. Exp. Sta.* **27.** 266–272. **3056**

The contributory causes of off-flavours in samples of milk are discussed with reference to the following :– bacterial growth, the feed of the cows before milking, direct or indirect absorption from an odorous atmosphere surrounding the cows, chemical composition of the milk, the heat treatment given to milk, chemical changes brought about by enzymes and addition of foreign material such as taints from bottles.

In searching for the possible cause of milk flavour defects the following facts are considered :– certain flavours are present only in raw milk, *e.g.* rancidity; if the flavour changes are brought by bacteria their numbers must be in millions per ml.; a sudden general outburst of complaints of flavour by purchasers usually indicates contamination with foreign matter; a general increasing number of complaints over an extended period indicate an oxidized flavour resulting from enzyme action; and that flavours resulting from direct absorption are practically nil.

In tracing flavour defects a general knowledge of the characteristics of milk flavours is essential. This involves not only the taste, but the history of the defect, conditions usually associated with specific causes and the season of the year when the flavour is most frequently encountered. Methods of sampling milk to determine the focal point of metal contamination in the plant are given.—D. S. RABAGLIATI.

DODSWORTH, E. (1948.) **Food adulteration and the law.**—*J. R. sanit. Inst.* **68.** 292–301. **3057**

D. discusses the high cost of providing and maintaining an efficient service to guard the nation's food supply, especially concerning milk, and the difficulty for the sanitary authority in carrying out the regulations regarding standards and sampling.

The presumptive standard for milk of 3% butter fat and 8·5% of solids other than fat, favours the vendor when it is considered that the average figure for all milk samples, genuine and adulterated, examined by the various public analysts in 1946, ranged from 3·39–3·85% for fat and 8·58–8·90% for solids-not-fat.

A series of law cases is mentioned showing how difficult it is to obtain a conviction in the courts for milk sold below the standard. The value of the freezing point (Hortvet) test is stressed as a most accurate means of proving adulteration; a depression of the freezing point of 0·530°C., obtained with genuine milk, is recommended as the standard. Under present conditions it is extremely difficult to know how and when milk can legally be sampled during transit and suggestions are put forward for a simplification of the conditions.

The legal standards for a variety of foodstuffs are discussed and the complicated relative positions of the Ministry of Health, the Ministry of Food and the local authority are explained. A plea is made for one ministry only to be responsible and it is noted that some improvement has already been made in this direction under the "Transfer of Functions (Food and Drugs) Order of 1948."

It is not clear who is an "authorized officer" under the Food and Drugs Act. D. considers that the penalties inflicted by the courts are as a rule insufficient to be a deterrent to adulteration.

In the discussion that followed, it was pointed out that during the war period there was a distinct decline in the quality of milk produced; various factors are mentioned as possible causes, such as poor feeding, insufficient stripping and so on, but the chief contributing factor is the breeding of cows for milk quantity rather than quality. It was considered essential that quality premiums should be paid to all producers of good quality milk.—D. S. RABAGLIATI.

DENT, J. E., MORLAN, H. B., & HILL, E. L. (1949.) **Effects of DDT dusting on domestic rats under colony and field conditions.**—*Publ. Hlth Rep., Wash.* **64.** 666–671. [Authors' summary copied *verbatim.*] **3058**

Data are presented, from a colony study and limited field collections of rats, which show that the distribution of 10 percent DDT in pyrophyllite [the mineral $Al_2O_3.4\ SiO_2.H_2O$] in domestic rat habitats resulted in pathological changes consistant with DDT poisoning and in the accumulation of appreciable quantities of DDT and DDA [a derivative of D.D.T.] in the livers and fat of exposed rats. These results indicated that DDT dusting for the control of diseases of domestic rodents not only decreased fleas significantly but also affected rodent populations directly. In the treated colony, 32·7 percent of the rat population apparently died from DDT poisoning within 7 weeks and 36·3 percent within 11 weeks after the colony habitat was dusted. General field observation indicated that such rates are in excess of those to be expected under field conditions where rats can exercise greater freedom in avoiding unfavourable situations.

See also abst. **3090** (animal insurance).

DE SOUZA-ARAUJO, H. C., & ROSSELL, C. S. C. (1946.) Isolamento de bacilos ácido-alcool resistentes das aguas dos efluentes das fossas "OMS" do Sanatorio Padre Bento (S. Paulo) e do Hospital-Côlonia Curupaity (Distrito Federal). **[Isolation of acid-alcohol fast organisms from the sewage effluent of a sanatorium.]** —*Mem. Inst. Osw. Cruz.* **44.** 763–771. **3059**

Samples taken from the effluent of sewage works of a leper asylum revealed bacilli similar to those of leprosy and human TB. The sediment from these works was dried and used as manure for the gardens and the effluent used to irrigate them. The authors consider that the whole system should be condemned.—R. MACGREGOR.

LIVESTOCK HYGIENE

FINDLAY, J. D. (1948.) **Experiments on the ventilation of cattle byres.**—*J. agric. Sci.* **38.** 411–424. **3060**

F. carried out a series of experiments on ventilation which extended over the winter and spring of two separate years. Two byres were used, each with an adjustable open ridge as an outlet, one housing 48 cows with a capacity of 1,248 cu. ft. per cow and the other housing 28 cows with a capacity of 567 cu. ft. per cow. When the tests were made all stalls in each byre were filled.

The first experiment was made to determine the atmospheric conditions of both byres when, (1) all inlets were open, (2) the inlets on one side of the byre were closed and (3) the inlets on both sides of the byre were closed. Whether the inlets were all closed, half closed or all open, appeared to have no marked or persistent effect on the temperature of either byre. Moreover, in the large byre the opening or closing of the inlets had no influence whatever on the CO_2 values, although in the small byre the inlets appeared to have some slight effect in reducing the CO_2 figure obtained.

In the small byre the opening or closing of the inlets seemed to have little or no influence on the cooling power as measured by the kata-thermometer readings, while in the large one the cooling power was actually higher when the inlets were closed than when they were open. In a byre with a long open ridge the inlets seem to have less importance than is generally believed.

The second experiment was to ascertain the relative importance of the size of the outlets necessary. F. sums up with the following conclusions:– (1) the desirable outlet area per cow should be in the neighbourhood of 144 sq. in. (2) The atmospheric conditions in the large byre were almost always better than in the small one, owing to the greater cubic capacity per cow. Adequate ventilation, could, however, be attained in the smaller byre provided that the outlet area was sufficiently large. (3) For the provision of good ventilation the air outlet is the most important factor. Only when outlets are closed do the inlets improve the ventilation. (4) King's Standard for CO_2 of 17 parts per 10,000 was found to be difficult to obtain; a standard of 22 parts per 10,000 is considered sufficient and easily attainable in any adequately ventilated byre. (5) A dry katathermometer cooling power of 7 is suggested as indicative of good ventilation. (6) Except during abnormally warm spells it should be possible to keep temperatures below 55°F. (7)

The difficulty of formulating definite standards of ventilation until more is known of the physiological reaction of the cow to different climatic conditions is stressed.—D. S. RABAGLIATI.

See also abst. **3075** (pastures).

REPRODUCTION AND REPRODUCTIVE DISORDERS

SALLMAN, B., & BIRKELAND, J. M. (1948.) **Inter-relations of spermatozoa count, hyaluronidase titre, and fertilisation.**—*Amer. J. Physiol.* **152.** pp. 271–279. **3061**

Semen of bulls was diluted 1 : 55 using an egg-yolk-citrate sulphonamide diluent and was issued for use in the field. Cows were recorded as pregnant on circumstantial evidence only (non-return to service), and the authors discuss the validity of this. Spermatozoa counts were made with an accuracy of ±18% and the mean of four determinations was taken for each sample. Abnormal spermatozoa were not estimated. Hyaluronidase was estimated by a turbidometric method which is described in detail, based upon the enzymic reduction of the turbidity of a colloidial suspension of hyaluronidase in blood serum. Fifty semen samples were considered involving 2,992 inseminations in 2,092 cows. The results were analysed statistically at length and spermatozoa count was found to be related positively and fertilizing power to be related negatively to hyaluronidase titre. There was no significant relationship between spermatozoa count and fertilizing power ($P = 0{\cdot}05$ level). By further analysis partial correlations were obtained; if the effect of hyaluronidase was corrected mathematically then a significant positive relationship existed between spermatozoa count and fertilizing power and similarly there was a highly significant negative relationship between hyaluronidase concentration and fertilizing power. A formula was derived relating fertilizing power to hyaluronidase concentration and spermatozoa count simultaneously.

In the discussion it was pointed out that hyaluronidase concentration was directly related to spermatozoa concentration, possibly being formed by or from the spermatozoa. Above certain concentrations the increase in the hyaluronidase concentration tended to decrease fertilising power whilst the increase in spermatozoa count had the reverse effect.—R. J. FITZPATRICK.

THIBAULT, C., LAPLAUD, M., & ORTAVANT, R. (1948.) **Technique and results of electro-ejaculation of bulls.**—*C.R. Acad. Sci., Paris.* **226.** 2006–2008. **3062**

With bulls which refuse service to conventional artificial vaginas, semen may be obtained by electrical stimulation using a bipolar rectal electrode. Such procedures yield poor semen, and the bulls have pain and react violently. The authors describe the use of a new rectal electrode consisting of 30 brass rings, insulated from each other, the rings being alternately connected to positive or negative poles of a potentiometer, which gave a current of 0·7 amps at 30 volts. The current is varied from zero to maximum and back to zero every 3–5 sec.

If all 30 brass rings are in the circuit, 15 positive and 15 negative, then the electrical stimulus does not irradiate far into the peri-rectal tissues and the resulting ejaculation consists only of accessory secretions with few spermatozoa. If only every fourth or sixth ring of the electrode is then left in circuit there is more widespread irradiation, and ejaculates containing very little accessory secretion and nearly 100% spermatozoa are obtained.

Figures are quoted to support the view that the semen obtained is as good as, or better than, that obtained by more usual techniques. No pain or violent reactions were observed.—R. J. F.

BASU, P. T., & BERRY, R. O. (1948.) **Comparative study of hen egg yolk citrate and turkey egg yolk citrate diluter in the preservation of bull spermatozoa.**—*J. Anim. Sci.* **7.** 447–448. **3063**

In view of the successful use of hens' egg-yolk as a semen diluent the use of egg-yolk from other birds was studied.

Each of 18 ejaculates collected by the artificial vagina from six bulls was divided into two parts. One part was diluted 1 : 10 with equal parts sodium citrate solution, one-eighth mol. concentration, and hens' egg-yolk and the other part of each ejaculate was diluted 1 : 10 with the sodium citrate solution, and turkeys' egg-yolk. The samples were stored at 40°F. and the percentage of motile spermatozoa in each sample was estimated daily.

The difference in method of dilution had no significant effect on either average motility or average longevity of the stored semen.

—E. J. H. FORD.

EATON, O. N., SCHOTT, R. G., SIMMONS, V. L., & FRANK, A. H. (1948.) **The effects of feeding thyroprotein on semen characteristics of rams.**—*J. Anim. Sci.* **7.** 449–454. **3064**

To study the effects of feeding thyroprotein on ram semen characteristics, three groups each of four rams were used. In each group was a

yearling and an aged ram of both Hampshire and Shropshire breeds.

All rams received daily from May 23rd to September 4th 1 lb. of a grain mixture containing 14·1% protein. In addition group (1) received 2 g. thyroprotein (3·01% thyroine) and group (2) 1 g. thyroprotein per lb. of grain mixture.

Semen samples were collected weekly from May 29th to September 11th and volume, motility, concentration and percentage of abnormal spermatozoa were noted. The following general conclusions were drawn.

Yearling rams gave a significantly greater volume of semen than mature rams. Semen concentration was higher in normally fed than in treated rams, higher in Hampshires than in Shropshires and declined in all groups towards the end of the treatment period. The percentage of abnormal spermatozoa increased with treatment and with age. Motility decreased with treatment and with age and was less in Shropshires than in Hampshires.

The conclusion is that feeding thyroprotein is not beneficial as it significantly reduces semen concentration, motility and the percentage of normal spermatozoa, though in yearling rams the volume of ejaculate is increased.

[Warwick *et al.*, see *V. B.* **19.** 304, obtained similar results in an experiment carried out in April, but in July a slight improvement in semen quality was noted in treated rams.]—E. J. H. F.

Bangs, C. L., & Underwood, E. J. (1948.) **A comparison of methods of estimating sperm concentration in ram's semen.**—*Aust. vet. J.* **24.** 89–93. **3065**

In view of the quickness and simplicity of the visual method of Gunn *et al.* [*V. B.* **13.** 370.] of estimating spermatozoa concentration of rams' semen, it was considered desirable that an assessment of its accuracy should be made and compared with that obtained by the use of the opacity standards method of Burbank (1935) and the photoelectric colorimeter method of Comstock & Green (1939) and Comstock *et al.* [*V. B.* **15.** 203.]

The results of density determinations of 35 samples of semen by the two visual methods were plotted against those from haemocytometer counts and the regression equations calculated for each method. A straight line relationship was found in each case. The correlation and regression coefficients were both highly significant at the 1% level for each of the visual methods. Calculation by the "Z" test of Fisher (1941) showed that the correlation coefficient obtained with the use of opacity standards was not significantly greater than that obtained by Gunn's method.

In the photoelectric determination of density, the same 35 samples were diluted with sodium citrate at the rates of 1 : 100, 1 : 200, 1 : 400, and 1 : 800. The correlation and regression coefficients for the four dilutions were highly significant at the 1% level. The accuracy of the procedure tended to fall at each end of the dilution scale. The four correlation coefficients were significantly greater than those for the visual methods.

It is concluded that the visual methods gave good estimations of sperm density although neither had the accuracy obtained with the photoelectric colorimeter. The use of opacity standards had no advantage over the method of Gunn and took more time. The photoelectric method was quicker and less tedious than cytometer counts and at least as accurate.—C. S. Sapsford.

Chesney, R. W. L. (1947.) **The use of stilboestrol dipropionate in the treatment of retained placenta and pyometra in cattle.**—*Vet. J.* **103.** 233–234. **3066**

C. reports on a 90% successful use of 10–20 mg. stilboestrol dipropionate, injected intramuscularly, in cases of retained placenta in dairy cows. Injections were made 36 hours after calving with a 60% response within 12–36 hours without any subsequent pyometra. When injections were delayed for 96 hours a second injection was often necessary after a further 72 hours if the placenta had not come away. C. expresses the opinion that the drug, if not specific, is very suitable for use in this condition especially as the risk of subsequent pyometra is considerably minimized.

Treatment of pyometra with two injections of 30 mg. stilboestrol, instead of iodine irrigation, was also highly successful although occasionally a third injection was necessary, and in practically all cases, conception occurred again at the ninth week from calving.—A. Eden.

Hayward, A. H. S. (1948.) **Action of stilboestrol in cases of anoestrus and suboestrus in buffaloes.**—*J. R. Army vet. Crps.* **19.** 67–71. **3067**

After a general discussion on the current theories of the actions of the pituitary and ovarian hormones, H. describes results following the injection intramuscularly of nine buffalo heifers with 10–20 mg. of stilboestrol.

Examination before treatment revealed inactive ovaries. After treatment oestrus occurred in from 1–3 days, but monthly examinations revealed no ovarian activity. Five control heifers not injected had neither oestrus nor ovarian activity.

The conflicting reports following similar experiments by previous workers are probably due to failure to carry out repeated examinations of the genital organs to establish the presence of true anoestrus. Conditions which may be confused with it are pregnancy, suboestrus, retained corpus luteum, cystic ovaries and endometritis. After

expression of the corpus luteum in the cow, oestrus is observed after two or three days and in the buffalo after about seven days.—E. J. H. Ford.

Droulers, J.-M. (1946.) Les applications du di-éthylstilboestrol en médecine vétérinaire. **[Stilboestrol in veterinary medicine.]**—*Thesis, Alfort.* pp. 45. **3068**

The chemistry, physiology, and therapeutic applications are reviewed, the latter both in the light of reports in the literature and of personal experience. The activity of di-ethylstilboestrol is comparable to that of oestradiol. It is, however, less expensive and can be given by mouth. Its principal indications in veterinary medicine are treatment of functional frigidity, particularly in the cow and sow; threatened abortion, and suppression of lactation in the bitch. The drug is not toxic when administered in the following doses :– cow : 30 40 mg.; ewe : 10 20 mg.; bitch : 10–15 mg.—W. R. Bett.

v.d. Kaay, F. C. (1947.) Vitamine E en steriliteit bij paard en rund. **[Vitamin E and sterility in horses and cattle.]**—*Tijdschr. Diergeneesk.* **72.** 571–598. [English, French & German summaries; abst. from summaries.] **3069**

K. observed that the vitamin E content in the blood of pregnant and non-pregnant cows was inconstant and was influenced by food, being higher in cows kept on pasture. In cows with a low tocopherol content pregnancy and birth were normal. *Brucella abortus* infection, sterility, anaphrodisia and nymphomania in cows had no influence on the tocopherol content; neither had vitamin E given *per os*, intramuscularly and intratracheally.

In mares, pregnant or non-pregnant, the blood level of tocopherol was variable and was not influenced by the type of food given.—E. G.

Weygold. (1948.) Die Sterilität der Bullen. **[Sterility in bulls.]**—*Dtsch. tierärztl. Wschr.* **55.** 299–301. **3070**

W. discusses the problems of sterility in bulls. Of the various forms of sterility, low fertilizing capacity is the most difficult to detect. It is necessary to determine the number of pregnancies from services. If the index is lower than 80% bulls should be eliminated from breeding, provided the serviced cows are not sterile. Young bulls should not be used before they are 15 months old.

W. advocates periodic microscopical examination of first and second ejaculates. The first cow served in the day should be mounted twice. Absolute cleanliness of the genital organs has to be observed.—E. G.

Holst, S. J. (1949.) **Sterility in boars.**—*Nord. Vet.-Med.* **1.** 87–120. [In English. Abst. from author's summary.] **3071**

The author examined the occurrence and the different forms of sterility in boars in Sweden. As a rule fertility in pig breeding is good. In breeding herds 1·3–1·5 services are usually needed per pregnancy, and in pig-breeding societies this figure may be somewhat lower. In some boar lines there have been comparatively numerous cases of impotence. Out of a boar that was apathetic to service at times, 22 young boars were bred, 12 of which had to be slaughtered on account of impotence. The author has also found that many cases of testicular hypoplasia appear in the same family.

In this paper a description is given of 26 cases of impotentia generandi in boars. Of these cases 6 are of testicular hypoplasia, 16 of degenerative testicular atrophy, 3 of inflammatory testicular changes, and 1 of testicular tumor. A report is given on the semen picture and the histological examination of testes. The semen picture in cases of reduced fertility or in cases of sterility on account of degenerative testicular atrophy varies to a great extent. In low-grade cases the number of spermatozoa is normal, and their motility good. The form of the sperm heads may be changed only to a small degree, but unripe spermatozoa are often very numerous. In graver cases of degenerative changes in the seminal epithelium the number of spermatozoa is low, their motility obviously reduced and the number of deformed sperm heads usually high.

The following average weights of testes were obtained: Boars with good fertility: right 594 gms.; left 632 gms. Testicular hypoplasia: right 226 gms.; left 240 gms. Degenerative testicular atrophy: right 423 gms; left 440 gms.

A brief description of the histological picture in the different testicular changes is given.

In order to explain how the semen picture alters in degenerative changes in the seminal epithelium and later becomes normal again, the author experimentally caused different stages of testicular degeneration in 5 test boars. To produce the desired effect the skin over the scrotal sac was treated with a skin-irritating ointment. The experimental results are illustrated by graphs.

Lübke, A. (1949.) Schilddrüseninsuffizienz als Ursache angeborener Wassersucht der Ferkel (sog. Speckferkel). **[Thyroid deficiency as a cause of congenital dropsy of piglets.]**—*Tierärztl. Umsch.* **4.** 15–21. **3072**

The author made a detailed study of the aetiology, morbid anatomy and symptomatology of congenital dropsy in piglets. L. examined 28 cases in an endemic (human) goitre district in southern Germany, and considered that the disturbance of the water metabolism, which

generally leads to death from circulatory failure within a few days of birth, was the result of thyroid insufficiency in the sow and foetus, accentuated during the cold season.

The recent rise in the incidence of this disease was tentatively attributed to changes in available feeding stuffs. Large-scale trials were instituted in an attempt to prevent the condition by feeding iodized salt.—G. P. MARSHALL.

DOLL, E. R. (1949.) **The treatment of septicemia of new-born foals with streptomycin and penicillin.**—*Cornell Vet.* **39.** 86–96. **3073**

Nineteen cases are reported of clinically diagnosed infection with *Bacterium equirule* (navel-ill, pyosepticaemia, " sleepers ", etc.). Streptomycin is recommended, given intramuscularly at a dose rate of 0·5 g. every three hours early in the disease, and continued for one or two days after acute symptoms have subsided.

—W. R. BETT.

See also absts. **2880-2888** (brucellosis); **2914-2917** (trichomoniasis); **2985** (canine testicular neoplasms); **3051** (mammalian ovum); **3052** (penis in sheep); **3053** (oestrogen); **3054** (sex hormones); **3069-3071** (sterility); **3091** (genetics); **3092** (obstetrics).

ZOOTECHNY

WHITTLESTON, W. G. (1948.) **Efficient mechanical milking.**—*Aust. J. dairy Tech.* **3.** 45–72. **3074**

An outline of the theoretical and practical aspects of machine milking intended for dairy farmers and others interested from a practical point of view.

The physiological factors concerned in lactation and in the let-down of milk are described and evidence that machine milking does not lead to an increase in mastitis is quoted. Descriptive and technical information is given on the operation of the milking machine.

W. also describes the layout of new plant and gives information on servicing.

A number of references are included.

—J. H. WHITTEM.

TRIBE, D. E. (1949.) **Some seasonal observations on the grazing habits of sheep.**—*Empire J. exp. Agric.* **17.** 105–115. **3075**

Five Cheviot sheep in a one-acre paddock each walked an average distance of 2·61 miles during a 24-hour period, most of this being covered during the daytime and most travelling being done in spring and autumn. Total grazing time during the 24 hours was approximately equal (9·5 hours) at all times of the year, but in winter the bulk of the grazing hours were between 7 a.m. and 7 p.m., the reverse being the case in summer. T. considers that total intake during winter is probably as great as that during summer months, and that the lower nutritive value of the herbage accounts for the unthriftiness during winter. Sheep prefer to graze small succulent plants and the fact that these are commonly more nutritious appears to be purely coincidental.

—G. B. S. HEATH.

See also absts. **2991** (soil fertility and animal production); **3090** (insurance of animals); **3093** (description of horses).

TECHNIQUE AND APPARATUS

BAKER, R. F., & PEASE, D. C. (1949.) **Sectioning of the bacterial cell for the electron microscope. [Correspondence.]**—*Nature, Lond.* **163.** 282. **3076**

Colonies of *B. megatherium* were fixed in 5% formalin, dehydrated with alcohol, impregnated with and embedded in " parlodion " and the " parlodion " block embedded in paraffin wax. Sections were cut at 0·1μ and flattened on a slide using needles under a binocular dissecting microscope. After removal of the paraffin with benzol, the slides were dipped vertically into 0·2% collodion in amyl acetate. The collodion film thus formed was floated off on a water surface. Microscope specimen screens were placed on the sections and the entire film inverted and mounted on another slide. After drying the specimens were ready for examination in the electron microscope.

—L. M. MARKSON.

BLANCO, F. L., & FITE, G. L. (1948.) **Silvering of lepra bacilli in tissues.**—*Arch. Path.* **46.** 542–549. [Authors' summary and conclusions copied *verbatim*.] **3077**

Lepra bacilli are readily silvered in blocks of lepromatous tissues with Jahnel's and other methods.

Bacilli silvered in the block undergo a minimum of distortion and yield a true picture of the infection of the tissues, scarcely obtainable with other methods. While such silvering is not practical as a routine clinical-pathologic procedure, it is highly valuable in the study of the lepromatous lesion.

Study of silvered sections shows that past concepts of the morphologic aspects and arrangements of bacilli are open to considerable revision. Actively growing organisms resemble minute colonies of fungi, and do not appear as " bundles " or " cigar packs ". A new concept of the nature of the globus is offered.

Different degrees of silvering observed indicate that the weakly silvered bacillus con-

stitutes one form of the degenerating organism.

GESSLER, A. E., GREY, C. E., SCHUSTER, M. C., KELSCH, J. J., & RICHTER, M. N. (1948.) **Notes on the electron microscopy of tissue sections. I. Normal tissue. II. Neoplastic tissue.**—*Cancer Res.* **8.** 534–546 & 549–573. [Authors' summaries slightly modified.] **3078**

I. Methods of sectioning, for the electron microscope, by the high speed microtome to the thickness of the order of 1/10 of 1 micron have been developed, as well as the auxiliary technics of fixing and embedding of specimens, to produce electron micrographs possessing satisfactory detail with a minimum of distortion by coagulation and shrinkage. These methods have been employed for the investigation by the electron microscope of sections of normal animal and human tissue, and hundreds of electron micrographs have been produced. Greater detail in general and some observations in particular have been presented by the authors in their electron micrographs which are not revealed by the light microscope, since dimensions are often involved which are below that instrument's threshold of resolution. The majority of their electron micrographs portray a quite consistent over-all picture in the appearance of cellular constituents. The outer and nuclear membranes appear as firm and well defined boundaries. The nuclei are generally well formed with fine granular texture and much denser nucleoli. The cytoplasm seems to be generally characterized by a coarser background with well defined and denser granular particles while the intercellular tissue shows submicroscopic fibrillar structure.

II. High-speed microtome slicing of tissue into sections approximately 1/50 as thin as the sections ordinarily used for the light microscope, as well as new technics of fixation required by the high resolution of the electron microscope have been developed and employed for the investigation of neoplastic tissue. Some observations in particular are presented by the authors' electron micrographs which they believe are not consistently revealed by the light microscope since often dimensions are involved below that instrument's threshold of resolution.

Signs of aberration observed in their electron micrographs of neoplastic tissue sections often seem to begin with the appearance of large numbers of vacuoles in intercellular tissue and cells. A characteristic aberration seems to be the breaking or disappearing of nuclear membranes and subsequent shrinking or breaking of the nuclear mass into dense fragments. A similar breaking of the outer cellular membranes frequently goes hand in hand, accompanied by the appearance of fibrils replacing them and often filling the cell interior.

In contrast, normal cells investigated by the same technics portray few vacuoles and solid, clear-cut boundaries for membranes. Their nuclei are well formed, round or oval shaped, and possess fine granular texture.

Every precaution has been taken to use only portions of tumors believed to be viable and the authors are convinced that some of the phenomena described are signs of neoplasia.

BOURNE, G. H. (1949.) **Use of Geiger counter for quantitative estimation of radioactive isotopes in histological sections.**—*Nature, Lond.* **163.** 923. **3079**

A detachable, movable stage had soldered to its under surface a 0·5 mm. sheet of copper in which a 0·5–1 mm. hole had been drilled. A microscope slide placed on the movable part of the stage could then be altered in position so that the whole of any section mounted on it could be "scanned" by the hole. All this was mounted on a lead castle containing in its hollow base a Geiger-Müller counting chamber. Over this was mounted a lead tray with an eccentrically-placed hole over which the movable stage could be laid. Different fields of the section could then be scanned separately, and estimated quantitatively by the rate of activation of the Geiger counter.

—L. M. MARKSON.

See also absts. **2062** and **3065** (artificial insemination); **3094** (microscopy).

MISCELLANEOUS

XIVTH INTERNATIONAL VETERINARY CONGRESS 1949

The following papers were presented to Congress. This list is given for information, the papers will be abstracted when they are published in the official Proceedings.

AKERBLOM, E. Rickets in horses. A clinical study.

ASPLIN, F. D., GORDON, R. F., & REID, J. Newcastle disease.

BANE, A. Investigations on semen production in monozygous bull twins.

BEACH, J. R. Newcastle disease (avian pneumoencephalitis) in the United States.

BEATON, W. G. Veterinary participation in the production of dairy products in Nigeria during the 1939–45 World War.

BENNETTS, H. W. The oestrogenic effects of

subterranean clover (*Trifolium subterraneum*).

Blakemore, F. Swine influenza.

Bonadonna, T. The role of the veterinary surgeon in the practice of artificial insemination.

Bratlie, O. Pathogenesis of mastitis.

Buddle, M. B. Vaccination against bovine brucellosis in New Zealand.

Bull, L. B. Chronic copper poisoning in grazing sheep in Australia.

Buxton, A., & Field, H. I. Salmonella infection in farm livestock.

Campbell, J. A. Recent work on the ecology of the pasture-tick *Ixodes ricinus* L. in Britain.

Carmichael, J. The epizootiology of African trypanosomiasis.

Childs, T. Control of tuberculosis in Canada.

Christenson, I. The importance of modern quarantine stations and of import and export control of animals and animal produce.

Clarenburg, A., & Vink, H. H. *Salmonella dublin* carriers in cattle.

Csukas, Z. The role of carotene in the periodicity of reproduction in live stock.

Cunningham, I. J. Copper deficiency diseases in New Zealand and the relation thereto of dietary molybdenum.

Davey, D. G. Trypanocidal drugs with special reference to animal trypanosomiasis.

Degois, E. Elevage du mouton. [Sheep husbandry.]

Delpy, L. P. Rôle des *Hyalomma* dans la transmission de la theilériose bovine. Biologie et taxonomie des espèces en cause. [Role of *Hyalomma* ticks in transmission of theileriasis. Bionomics and taxomony of *Hyalomma*.]

Diesel, A. M. The epizootology of " lumpy skin disease " in South Africa.

Donatien, A. La peste porcine en Algérie. [Swine fever in Algeria.]

Doyle, T. M. Immunisation against swine fever.

Dozent, P., & Sperri, H. Formveränderungen des Pferde-Elektroventrikulogrammes. [Electrocardiograms of horses.]

Dybing, O. The vesicula seminalis test and the diagnosis of pregnancy in mares.

Eckell, O. A. Misapprehensions concerning plant poisoning in cattle and horses, plants considered to be useful that are poisonous and plants considered to be poisonous that are useful.

Edgar, G., Hart, L., & Hayston, J. T. Studies on the viability of the virus of swine fever.

Edwards, J. T. Uses and limitations of the caprinized virus in the control of rinderpest (cattle plague) in Near Eastern and British cattle.

Ender, F., Halse, K., & Slagsvold, P. Studies on the importance of the dietary magnesium in the production and prevention of hypomagnesemia in dairy cows and its relation to the tetany-paresis syndrome.

Eriksson, K. Hereditary disturbances of reproduction in cattle.

Finlay, G. F. Genetic aspects of fertility.

Formston, C. Traumatic reticulitis in cattle. Its diagnosis, treatment and prognosis.

Frenkel, H. S. The cultivation of foot-and-mouth disease virus vaccine prepared with this virus.

Garm, O. Endocrine disturbances in bovine nymphomania.

Geurden, L. M. G. Botulism in men and animals.

Gordon, H. McL. Anthelmintics and the control of helminth diseases of sheep.

Gregory, T. S. Diagnosis and control of bovine tuberculosis in the Australian environment.

Grini, O. Salmonella infections in animals in Norway.

Groenewald, J. W. Bone disease in equines.

Hagan, W. A., & Evans, W. M. The diagnosis of rabies.

Hancock, J. L. Endocrinology and reproduction in the cow.

Harbour, H. E., Whitten, L. K., & Allan, W. S. Post dipping lameness in sheep.

Hart, G. H. Plants as animal feedstuffs.

Hart, L. Fowl coryza (*Haemophilus gallinarum* infection).

Hauge, S. Salmonella in dehydrated egg products and its public health significance (with special reference to Norwegian outbreaks).

Heath, G. B. S. The control of sheep ticks, *Ixodes ricinus*, L., & blow flies, Calliphorinae.

Henry, M. Swine fever—control and eradication.

Hignett, S. L. The complex nature of herd infertility.

Hinshaw, W. R. Salmonellosis—a veterinary public health problem.

Hjärre, A., *et al.* Experimental investigation into swine influenza in Sweden with special regard to the etiological importance of haemoglobinophilic bacteria.

Hoflund, S. A. The connection between deficiency diseases and disturbances in the microflora of the rumen.

Hofmann, W. Das staatliche Tuberkulosebekämpfungsverfahren in der Schweiz. [State control of bovine tuberculosis in Switzerland.]

Hokl, J. The importance of technology for the control of food of animal origin.

Holmberg, J. Experiences in the control of contagious abortion in Finland.

Holst, S. The semen of sterile boars.

Holt, A. F. Methods and problems of artificial insemination in Great Britain.

Hudson, J. R. A specific venereal disease of

cattle characterized by epididymitis in bulls and vaginitis in cows and heifers.

JACOTOT, H. Qualités majeures du vaccin tissulaire formolé aluminé. Indications de son emploi. [Properties of rinderpest inactivated tissue vaccine.]

JAMIESON, S., & ALLCROFT, R. Hypocupraemic pining of calves in Caithness.

JANSEN, J., & KUNST, H. Is duck plague related to Newcastle disease or to fowl plague ?

JEPSEN, A., & ROTH, H. Epizootiology of *Cysticercus bovis*—resistance of the eggs of *Taenia saginata.*

JURNY, F. An inhaler for horses.

KERR, W. R., & LAMONT, H. G. The immune response in trichomoniasis.

KESTEVEN, K. V. L. Lapinized rinderpest vaccine.

KOLLER, R. Porphyrine in der Tiergesundheit. [Porphyrin in veterinary medicine.]

KOTLÃN, A. The developmental and pathological significance of the histotropic phase in parasitic nematodes.

LAFENÊTRE, H. La lutte contre la brucellose ovine et caprine en France. [Control of brucellosis in sheep and goats in France.]

LANNEK, N. A clinical and experimental study on the electrocardiogram in dogs.

LARROUX, S. Les vaccins au crystal violet dans le contrôle de la peste porcine. [Crystal violet swine fever vaccines.]

LAWSON, J. R., & DALLING, T. Recent experiences in brucellosis in Great Britain.

LEMÉTAYER, E. Recherches sur l'anémie infectieuse expérimentale des équidés. [Experimental study of equine infectious anaemia.]

LEWIS, E. A. Recent developments in insect and tick-borne diseases in East Africa.

LITTLE, R. B. Bovine mastitis : recent advances in theories regarding the susceptibility of the udder to infection.

MCCALLUM, J. A. Control in the United States of animal products intended for human consumption.

MANNINGER, R. Virus abortion in mares.

MARTINEZ-CAMPOS, C. The influence of varying levels of thyroid activity on semen production in the domestic fowl.

MICHALKA, J. Schweinepest (Aktive Immunisierung). [Active immunization against swine fever.]

MICHELSEN, E. Studies on the antigenic constancy of foot and mouth disease virus.

v. MOCSY, J. Die Verwendung der Kontaktgifte in der Veterinaermedizin. [Contact insecticides in veterinary medicine.]

MOMBERG-JORGENSEN, H. C. Salmonella infections in fur-bearing animals in Denmark.

MONTEVERDE, J. J., & GARBERS, G. V. Equine infection in Argentina due to *Salmonella abortus-equi.*

MOOSBRUGGER. Recherches récentes sur le virus de la fièvre aphteuse. [Recent research on the foot and mouth disease virus.]

MOUSTGAARD, J., & THORBEK, G. Observations on the importance of pantothenic acid and pyridoxine to the protein metabolism of growing pigs.

MURNANE, D. Some observations on the control of mastitis of dairy cows in Australia.

MUSTAKALLIO, F., & RISLAKKI, V. Blood groups of cattle. Experiments made on heteroimmune sera.

NAERLAND, G. Nutrition in relation to nematode parasitism in sheep.

NIELSEN, F. Sterility in cattle, especially as a result of uterine infection.

NIELSEN, F. W. The organisation and control of the fight against tuberculosis among cattle in Denmark.

NIZNANSKY, F. Die Ansteckende Blutarmut der Pferde in der Tschechoslowakei. [Equine infectious anaemia in Czechoslovakia.]

OTTOSEN, H. E., & PLUM, N. Intradermal brucellosis tests in cattle with a non-antigenic agent.

PEETERS, G. The " let down " of milk from the udder alveoli of cattle.

PIRES, A. Curarization : an auxiliary in anaesthesia and an excellent resource for veterinary surgery.

PLANK, G. M. V. D., & HIRSCHFELD, W. K. Increasing mean milk-production by a change from the usual method of selective breeding of cattle.

POWLYE, J. O. Control of animal health by statutory measures.

PURCHASE, H. S. The problem of rinderpest in peasant and undeveloped countries.

QUENTIN, M. Anémie infectieuse des équidés. [Equine infectious anaemia.]

QUIN, J. I. Physiological aspects of research into animal nutrition in South Africa.

RAY, J. D. Hog cholera (swine fever).

RAYSKI, C. Observations on the life-history of *Moniezia* with special reference to the bionomics of the oribatid mites.

RITCHIE, J. N. Tuberculosis in cattle from the public health aspect.

RUDOLF, J. Die Teschener Krankheit und ihre Diagnose. Diagnosis of Teschen disease of pigs.

RUNGE, S. Diagnostic value of ferrocyanide in equine infectious anaemia.

SALCES, F. Importance of hereditary factors in the breeding of Argentine military horses.

SAMPSON, J. Physiological aspects of therapy for acetonemia in ruminants.

SCHANG, P. J. La variole des porcelets. Sa transmission par l'*Haematopinus suis* et sa profilaxie. [Transmission of swine pox by *Haematopinus suis*.]

SCHANG, P. J., ROSSI, F. A., ARAMENDI, M. C., & CAMPION, R. L. Obtention de sérum polivalent antiaphteux de haut titre. Ses applications. [Preparation of polyvalent foot and mouth disease serum.]

SCHLOTTHAUER, C. F. Veterinary anaesthesia: a review of some agents commonly used in veterinary medicine.

SCHNEIDER, L. Vaccination and serum treatment against fowl pest (Newcastle disease).

SCHOENING, H. W. Equine encephalomyelitis in the United States.

SCHWANNER, E. Preventive vaccination of dogs as a method of eradication of rabies.

SEEKLES, L. Mode of action and occurrence of minor elements in the animal body in relation to the problem of real and conditioned deficiencies.

SIMONNET, H. Glandes endocrines et santé animale. [Endocrine glands and animal health.]

SJOLLEMA, P., *et al.* Infectious sterility in cattle, caused by *Vibrio foetus*.

SLAGSVOLD, L. Measures taken in Norway against infectious cattle mastitis.

SØRENSEN, E. Experiences with artificial insemination in Denmark during ten years.

STABLEFORTH, A. W. Mastitis in milking cows with special reference to eradication of *Str. agalactiae*.

STECK, W. Recent studies on equine infectious anaemia.

STENIUS, R. Experience gained in the control of bovine tuberculosis in Finland.

STERNE, M., & WENTZEL, L. M. Botulism in animals in South Africa.

SWALES, W. E. The role of chemotherapy in the control of coccidiosis of chickens.

TAYLOR, E. L. The epidemiology of fascioliasis in Britain.

THIJN, J. W. The morphological blood picture in bovine tuberculosis.

THOMSEN, A. Experimental studies on the incubation period of infectious abortion in cattle.

TUFF, P., & GLEDITSCH, L. A. *Ichthyosis congenita* in calves—a hereditary character.

VANDEPLASSCHE, M., & PAREDIS, F. The viability of bull semen in the genital tract of cows and heifers.

VERGE, J. Le rôle de *Salmonella abortus equi* en nosologie humaine et veterinaire. [*Salmonella abortus-equi* in human and veterinary medicine.]

DE VRIES, L. P. The organisation for the fight against tuberculosis in cattle in the Netherlands.

WARDLE, R. N. The importance of quarantine control on importations of animal products.

WESTERMARCK, H. Some experiences on the changes in the vitamin and mineral content in blood during the development of pneumonia in horses.

WHITTEN, L. K. Photosensitized keratitis in calves after dosing with phenothiazine.

WIRSTAD, H. F. Osteosynthesis and veterinary surgery.

WRIGHT, J. G. Caesarian section in the bovine.

BOOK REVIEWS

DOWLING, H. F. [M.D., F.A.C.P.; Clinical Professor of Medicine, George Washington University; Chief, George Washington Medical Division, Gallinger Municipal Hospital]. (1948.) **The acute bacterial diseases; their diagnosis and treatment.** pp. ix+465. 52 tables. Philadelphia & London: W. B. Saunders Company. 32s. 6d. **3080**

The arrangement of this book indicates the change which has taken place in the attitude of the physician towards the bacterial diseases as a result of the introduction of the sulphonamides, penicillin and other antibiotics and also of improvements in laboratory methods of diagnosis. In the past, interest was directed mainly towards the clinical features and pathology of these diseases and this was reflected in the nomenclature used, such as "scarlet fever" and "lobar pneumonia".

Nowadays the disease is identified according to the causal organism and in this book we find the diseases grouped according to their causes with chapter headings such as "Infections with Beta-Haemolytic Streptococci", "Infections with Hemolytic Streptococci", and so on. The first part of the book deals on general lines with diagnosis and treatment, then follow three sections dealing with diseases caused by cocci, diseases caused by bacilli, and bacterial diseases in which exotoxins are a major factor. The book deals solely with disease in man and is written for the practitioner. It is interesting to note that glanders in man is no longer considered a fatal disease as sulphadiazine has been found very effective in treatment both in experimental animals and in man. Similarly, anthrax in man is now successfully treated with penicillin.—M. C.

STEPHENSON, M. (1949.) **Bacterial metabolism.** pp. xiv+398. London: Longmans, Green & Co. 3rd Edit. **3081**

The third edition of this well known book by the late Marjory Stephenson, Sc.D., F.R.S., retains the stimulating character of previous editions, and provides the reader with a concise picture of the chemistry of bacteria. The introduction in itself is a vivid picture of the history and progress of the subject. Large chapters are devoted to respiration, polysaccharides, growth and nutrition, and nitrogen fixation and autotrophic bacteria are admirably discussed in further sections. The best parts of the book are those dealing with fermentation, nitrogen metabolism and enzyme variation and adaptation. Shorter chapters deal with nucleic acid metabolism and bacterial photosynthesis. A minor criticism is that the author occasionally presents facts in such detail that clarity tends to be lost; this is noticeable particularly when discussing fermentation and autotrophic bacteria. The appendix contains useful formulae.

The book should be of value for general reading and the extensive bibliography helpful to the specialist.—A. B. PATERSON.

FANCONI, G., & LÖFFLER, W. (1948.) Streptomycin und Tuberkulose. **[Streptomycin and tuberculosis.]** pp. 357. Basel: Benno Schwabe & Co. Broschiert Fr. 30.–. **3082**

This is a symposium by a number of workers. It contains papers dealing with experimental studies of streptomycin; on the use of streptomycin in treatment of tuberculosis affecting various organs and on the pathology of tubercular meningitis after unsuccessful treatment with streptomycin. There is an extensive bibliography.

—M. C.

NÈGRE, L., & BRETEY, J. (1947.) Vaccination par le B C G par scarifications cutanées. **[B C G inoculation by scarification.]** pp. ix + 115. Paris: Masson et Cie. 2nd Edit. Fr. 220. **3083**

In this small book the authors discuss the efficacy of B C G vaccination by scarification as compared with subcutaneous and intradermic injection. They produce evidence that a state of allergy is brought about as quickly and lasts as long after vaccination by scarification as by the better known methods. The simplicity of the technique and its freedom from undesirable local reactions are great advantages and the method is considered to be the method of choice in man. The method was also tested on five calves aged from eight days to four months. They were negative to the intradermic tuberculin test prior to vaccination. Eight scarifications were made on the shaved and cleansed skin of the forehead through and across several drops of a concentrated suspension of B C G (500 mg. of culture in 1 ml.).

In a few days there was infiltration of the skin followed by thickening and hardening which disappeared after four or five weeks. There was no suppuration and no enlargement of the regional lymph nodes. The calves were not subjected to a test inoculation with virulent organisms, but all became positive to the tuberculin test.

The authors have not had the opportunity of studying the duration of allergy nor of determining whether the method has any advantage, in cattle, over the more usual subcutaneous method.—M. C.

DÉVÉ, F. (1948.) L'echinococcose osseuse. **[Echinococcus infection of bones.]** pp. 236. Montevideo: A. Monteverde & Co. Fr. 700. (14s. 6d.). **3084**

The history, pathology, pathogenesis, symptoms, diagnosis and treatment of the rare osseous localization of echinococcus cysts in man is described and a chapter deals with experimental study of the lesion in rabbits.—M. C.

SAHYUN, M. [Edited by] [Chemist Consultant]. (1948.) **Proteins and amino acids in nutrition.** pp. xvi + 566. Numerous photographs, figs., tables. London: Chapman & Hall. Price 45s. **3085**

This work is a symposium by leading American biochemists and physiologists on the subject of proteins and amino acids. It covers the important role of protein in nutrition, the consequences of protein and amino acid deficiencies, and the interrelationships of proteins and other dietary constituents. The conception of the work was due jointly to the Editor and C. Schmidt who unfortunately did not live long enough to complete the chapter he intended to write or to see the work in the final form which he had envisaged.

The book comprises 15 chapters covering every aspect of proteins and a very valuable historical introduction is included, with two detailed appendixes on the proximate composition of American food materials and on the nutritive value of 100 g. of the edible portions of selected foods. Each chapter is comprehensive in itself with a very good bibliography to original papers and works under numbered references.

The book should serve as a valuable reference work to all engaged on biochemical and physiological research work and teaching on proteins.

At the present rapid rate of expansion of our knowledge of this most fundamental of all subjects it is evident that regular and periodic revisions of the text to bring the work up to date will be necessary.—A. EDEN.

GARDNER, W. [Revised by Cooke, E. I.] (1948.) **Chemical synonyms and trade names. A dictionary and commercial handbook.** pp. 558. London:

The Technical Press Ltd. 5th Edit. 50s. **3086**

A new edition of this well known dictionary contains 28,000 items including words cross referenced. It appears to cover general and industrial chemistry but does not deal systematically with pharmaceutical chemistry, although numerous chemical compounds which are, or can be, used as drugs, are included.

The book is, therefore, of general interest in veterinary libraries as a source of information on the identity of miscellaneous chemicals and will no doubt continue to be of service in this respect. The printing is clear and the binding appears to be adequately strong for normal purposes.—J. E.

ANON. (1948.) **Bibliography of the literature on the minor elements and their relation to plant and animal nutrition.** Vol. I. pp. 1037. New York: Chilean Nitrate Educational Bureau, Inc. 4th Edit. **3087**

This Fourth Edition, Volume I, contains approximately 10,000 abstracts and is intended primarily for the use of institutions and scientists engaged in agricultural and nutritional research. Though nothing is said about further volumes it is presumed that some further issue is contemplated. This edition includes all material published in eight previous volumes together with some new material up to June 30th, 1947.

The contents of the Third Edition and seven supplements were cut apart, abstract by abstract, rearranged, photographed, in this way eliminating the enormous task of proof reading and checking. The abstracts and references were originally obtained from Chemical Abstracts, published by the American Chemical Society; Experimental Station Record, published by the U.S. Department of Agriculture; Soils and Fertilizers, published by the then Imperial, now Commonwealth, Bureau of Soil Science, Harpenden, England; and other journals.

The elements are arranged in alphabetical order and after the abstracts on zinc follows a series of unclassified abstracts. There are four indexes, author, element, general nutrition and botanical, giving a very comprehensive guide to the literature.

All users will appreciate the enormous task of compiling and preparing the material for this publication and will benefit by the presentation of so much information in a most convenient form.

—E. M. J.

DARRASPEN, E., FLORIO, R., & JOUBERT, L. (1949.) Les sérums salés en médecine vétérinaire. **[Solutions of metallic salts in veterinary medicine.]** pp. 124. Paris: Vigot Frères. **3088**

This book is based on work carried out at the Toulouse Veterinary School over a period of 20 years. After a short historical note, the authors list the various types of salt solutions and discuss the physiology of water absorption, utilization, and excretion, with particular reference to the part played by sodium chloride.

The next section is devoted to the pathological manifestations in domestic animals of salt-deficient diets and of excessive loss of salt from the tissues.

The third section of the book deals with the various diseases in which the use of saline solutions is indicated. The authors make no extravagant claims for this form of therapy and are at pains to point out that it is only suitable in certain conditions. Finally, they give dosages for the dog, the horse, and the cow, and discuss the best method of introduction. Each section has an extensive bibliography, which is international in scope with, of course, a strong French bias. [The term " sérums salés " used in this book and often used in France must not be translated as " saline sera "; it refers merely to a solution of sodium chloride and to a mixture of certain soluble salts.]

—W. R. BETT.

TAGAND, R., & BARONE, R. (1948.) Abrégé d'Angeiologie du Cheval. **[Abridged angiology of the horse.]** pp. 168. Lyon: Imprimerie des Beaux-Arts. **3089**

The Lyons anatomists have produced this book chiefly as a dissection guide for students. Following 28 pages on the heart, the circulatory system is considered first in principle, then by a description of individual arteries and veins. The method is good. The origin, course and termination of each vessel is considered, followed by its relation, structure and the distribution of collateral branches, while synonyms leave one in no doubt as to the vessel under description. The coloured drawings are very accurate and approval must be given to the practice of presenting the same drawing in different places which obviates constant turning back of the page when following the text.

The section on lymphatics is probably the best, although perhaps many will object to the term " ganglions lymphatiques " in place of " nodes " or " glands ". The whole system is considered on a regional basis which lends to an appreciation of its continuity.

The book is well worthy of the attention of anatomists and their pupils. It contains little new information, but it is well set out.—C. W. O.

DE JUVIGNY, C. (1947.) Assurance mortalité des animaux. (Chevaux et bovins.) **Insurance of domestic animals against mortality. (Horses and cattle.)** pp. 342. Versailles: Editions de " L'Observateur ". **3090**

A perusal of this work gives one the impression that the insurance of animals—horses and cattle in particular—discussed in this volume,

must be much more frequently practised in France than is the case in the United Kingdom, especially for commercial stock. In his preface the author suggests that this book is the most important yet published on animal insurance, and on reading it one can well believe this to be the case.

In general, horses and cattle under six months of age, horses over eleven and cattle over seven years of age, are not insured, although in certain cases policies for animals below and above this age can be negotiated.

The book is divided into two parts, followed by some appendixes. The first part deals with the general principles of insurance, questions of ownership, single or joint, the type of animal to be insured, conditions under which the insurance companies can limit or withhold liability, and so on. Questions of supplementary guarantees on old policies or the drawing up of new ones for such purposes as hiring or loaning out an insured animal, general depreciation of stock, insurance against castration risks, pregnancy, parturition, transport, for animals taking part in sports meetings or races and for animals on common grazings are discussed at some length. In this part also a very interesting chapter is devoted to insurance by horse-dealers so as to meet the various liabilities of the trade.

The second part of the volume, comprising 132 pages, is devoted to the more legal aspects of insurance. Chapter IV of this part deals with the definition of accidents, which includes disease, both specific and non-specific. It is pointed out that the insured must immediately notify the insurer of any accident or the onset of any disease in the case of an insured animal and it is incumbent on the owner to carry out all veterinary police measures prescribed for contagious disease. These diseases are prescribed by the law of July 7th, 1933, and comprise rabies, cattle plague, bovine contagious pleuro-pneumonia, blackleg, anaplasmosis, certain forms of tuberculosis, sheep pox, *Brucella melitensis* infection, mange, foot and mouth disease, glanders, anthrax, swine erysipelas, infectious pneumo-enteritis in pigs and infectious anaemia in horses.

The first appendix to the book gives legal citations dealing with different aspects of insurance and this is followed by the legal codes on insurance, the most important being the law of 18th July, 1930. Finally, extracts from the laws dealing with the contagious diseases of animals are included along with the various veterinary police measures to be enforced.

The book is well printed on good paper, but with a paper cover. To those interested in animal insurance we recommend this work.—D. S. R.

MATHER, K. [F.R.S., D.Sc., Ph.D.; Professor of Genetics in the University of Birmingham]. (1949.) **Biometrical genetics. A study of continuous variation.** pp. ix+162. London: Methuen & Co. Ltd. 18s. **3091**

As the author points out in the preface, the growth of the science of genetics has been very rapid in the past 50 years since Mendel gave to the world his principles of heredity and his method of experiment for the study of these principles. That method is based on the recognition and utilization of unit differences in the genetic materials and depends for its success on the ability to assign individuals to classes having clear phenotypic distinctions. It is therefore admirably adapted to the study of discontinuous variation but it cannot be used where the variation in phenotype is fully continuous and for that reason the study of continuous variation has lagged behind that of discontinuous variation. This book is devoted to discontinuous variation or multifactorial inheritance and to the development of methods for its study.

Such studies are necessarily based on measurements and the author examines the methods and types of experiment which are being evolved and outlines a method of statistical analysis. The importance of the subject to those concerned with the genetics of such things as milk yields and egg production will be obvious.

The book is written for the specialist and a considerable knowledge of genetics and statistics on the part of the reader is assumed.—M. C.

GALLI, A. (1948.) Pagine di ostetricia e ginecologia veterinaria. **[Veterinary obstetrics.]** pp. 186. Pisa: Vallerini Editore. **3092**

The author limits the scope of the book to the presentation and discussion of the commoner aspects of obstetric practice.

After an outline of the anatomy and physiology of reproduction, including a chapter on artificial insemination, he proceeds to treat in greater detail the pathology of fertilization. There is a noteworthy table showing the intrinsic causes of sterility in both sexes. Chapters on abnormal pregnancy and abortion from various causes are followed by a section on pregnancy diagnosis. At the end of the latter, surprisingly a whole page is devoted to a plea for serious consideration to be given to a method spoken of as "radioaesthesia" for determining, by means of a wooden pendulum, not only the existence of pregnancy, but also the sex of the foetus.

He gives a compact account of the normal birth, together with details of obstetric equipment. Embryotomy, the management of dystocia, and pelvimetry are also described and reference is made to complications and diseases of parturition.

The absence of any classified indexes or

references, together with the general tone of the book, suggest a complete series of lectures, incompletely edited.—G. P. MARSHALL.

WILLEMS, A. E. R. (1949.) Signalement van het Paard. [**Description of horses.**] pp. 79. Antwerp: N. V. Standaard-Boekhandel. **3093**

This is a little book of pocket size which gives comprehensive descriptive terms used in connexion with horses—type, sex, breed, size, age, coat and markings, and so on. To some extent the French meanings are given of the Dutch terms, so making the book of increased reference value. The greater part consists of coloured plates with suitable explanatory notes, of the incisor teeth of horses of varied age, a feature of much value to persons learning how to estimate a horse's age, as the information can be carried about easily for ready reference.—J. E.

OCKENDEN, F. E. J. [M.I.E.E., F.Inst.P.]. (1947.) **Illuminants and illumination for microscopical work.** pp. 26. 3 plates, 9 figs., 4 tables. Monographs of the Quekett Microscopical Club. London: Williams & Norgate Ltd. 2s. 6d. **3094**

After a general theoretical introduction, the respective merits and demerits of various illuminants for microscopy are discussed: daylight, direct sunlight, the acetylene burner, tungsten filament lamps, pointolite, carbon arcs and mercury vapour lamps. The concluding section relates illuminants to the optical system of the microscope, with particular reference to the substage condenser, as well as lamp condensers. A concise, compact account, both interesting and useful, is given of the subject. The illumination of opaque objects is not discussed.—L. M. MARKSON.

BOOKS RECENTLY RECEIVED

[Notice of recently received books in this list does not preclude review]

CONN, H. F. (Edited by). (1949.) **Current therapy 1949—latest approved methods of treatment for the practising physician.** pp. xxxii+672. Philadelphia: London: W. B. Saunders Co.

CUMMINS, S. L. (1949.) **Tuberculosis in history from the 17th century to our own times.** pp. xiv+205. London: Baillière, Tindall & Cox. 21s.

DAHMEN, H. (1949.) Lehrbuch der Veterinär-Mikrobiologie. [**Textbook of veterinary microbiology.**] pp. viii+268. Berlin: Paul Parey. 4th Edit. 12 DM.

ELTON, C. (1949.) **Animal ecology.** pp. xx+209. London: Sidgwick & Jackson Ltd. 4th Impression with additional notes. 18s.

GADOLA, A. (1948.) Zootecnia profilassi e igiene zootecnica in Africa Orientale. Parte 1° & 2°. [**Zootechny, medicine and animal hygiene in East Africa. Part I & II.**] pp. 230 & 511. Rome: Istituto Superiore di Sanità.

HOFFBAUER, F. W. (1948.) **Liver injury.** (Transactions of the Seventh Conference January 15 and 16, 1948, New York, N.Y.) pp. 95. New York: Josiah Macey, Jr. Foundation. $1.50.

HOLMES, F. O. (1948.) **The filterable viruses.** (Supplement No. 2. Bergey's Manual of Determinative Bacteriology.) pp. xxiii+160. London: Baillière, Tindall & Cox. 6th Edit. 20s.

LOTHIAN, G. F. (1949.) **Absorption Spectrophotometry.** pp. 196. London: Hilger & Watts Ltd. 26s.

JONES, H. W., HOERR, N. L., & OSOL, A. (Edited by). (1949.) **Blakiston's New Gould Medical Dictionary.** pp. xxviii+1294. Philadelphia: The Blakiston Co. 1st Edit. $8.50.

MARKOWITZ, J. (1949.) **Experimental surgery including surgical physiology.** pp. xiv+546. London: Baillière, Tindall & Cox. 2nd Edit. 40s.

MICHELSEN, E. (1949.) Mund- og Klovesyge Virus. Studier over den antigene Variabilitet. [**Foot and mouth disease virus. Studies on its antigenic variability.**] pp. 162. Copenhagen: A/S Carl Fr. Mortensen.

MOULTON, F. R. (Edited by). (1949.) **Rickettsial diseases of man. A symposium on the rickettsial diseases of man organized by the Section on Medical Sciences of the A.A.A.S. and presented at the Boston Meeting on December 26-28, 1946.** pp. 247. Washington 5: American Association for the Advancement of Science. $6.25.

ROUGHTON, F. J. W., & KENDREW, J. C. (1949.) **Haemoglobin. A symposium based on a Conference held at Cambridge in June 1948 in memory of Sir Joseph Barcroft.** pp. xii+317. London: Butterworths Scientific Publications. 40s.

VANNOTTI, A., & DELACHAUX, A. (1949.) **Iron metabolism and its clinical significance.** pp. 267. London: Frederick Muller Ltd. 32s.

6052—Wt.P8—Dd294—3/50—H.R.G., Ltd.—G13.

Printed in Great Britain under the authority of His Majesty's Stationery Office by H. R. GRUBB, LTD., Croydon.

INDEX VETERINARIUS

The publication of *Index Veterinarius* commenced with the indexing of the literature of 1933. It is a complete index of current publications relating to veterinary research, public health, administration, education and other aspects of veterinary science.

The latest list of the publications searched for this purpose was included in *Index Veterinarius*, Vol. 6, No. 1 (issued December, 1938) and also circulated with the *Veterinary Bulletin*, Vol. 9, No. 1.

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Commonwealth Bureau of Animal Health, Weybridge.

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Commonwealth Bureau of Animal Nutrition, Aberdeen.

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Commonwealth Bureau of Animal Breeding and Genetics, Edinburgh.

The semen of animals and its use for artificial insemination. By James Anderson. Spring, 1945 ... ... 7s. 6d.

Commonwealth Bureau of Pastures and Field Crops, Aberystwyth.

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U.S.A., Florida. Ann. Rep. Agric. exp. Sta., 1946, 1124.
—, Georgia. Ann. Rep. Coastal Plain Exp. Sta., 1943-44, 1122, 1946-47, 1123.
—, Los Angelas County Livestk. Dept., California, 1947, 1408.
—, Massachusetts. Ann. Rep. Agric. Exp. Sta., 1946, 1409.
—, Rep. Admin. Agric. Res., 1945, 2018.
—, Rockefeller Fndn, 1947, 1407.
—, Washington. Rep. Agric. Res. W. Wash. Agric. Exp. Sta., 1942, 1410.
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—, Edwards, H., & Bertram, D. S., 2458.
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Uruguay. Ann. Rep. Livestk. Dept., 1947, 1125.
—, Proc. 1st Nat. Congr., 1947, 1696.
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